ISSUE 205 JULY 2011

Better Homes and Gardens®

WOOD

The World's Leading Woodworking Resource

SHOP-TEST: BISCUIT JOINERS p.38

Easy-to-Build Glider

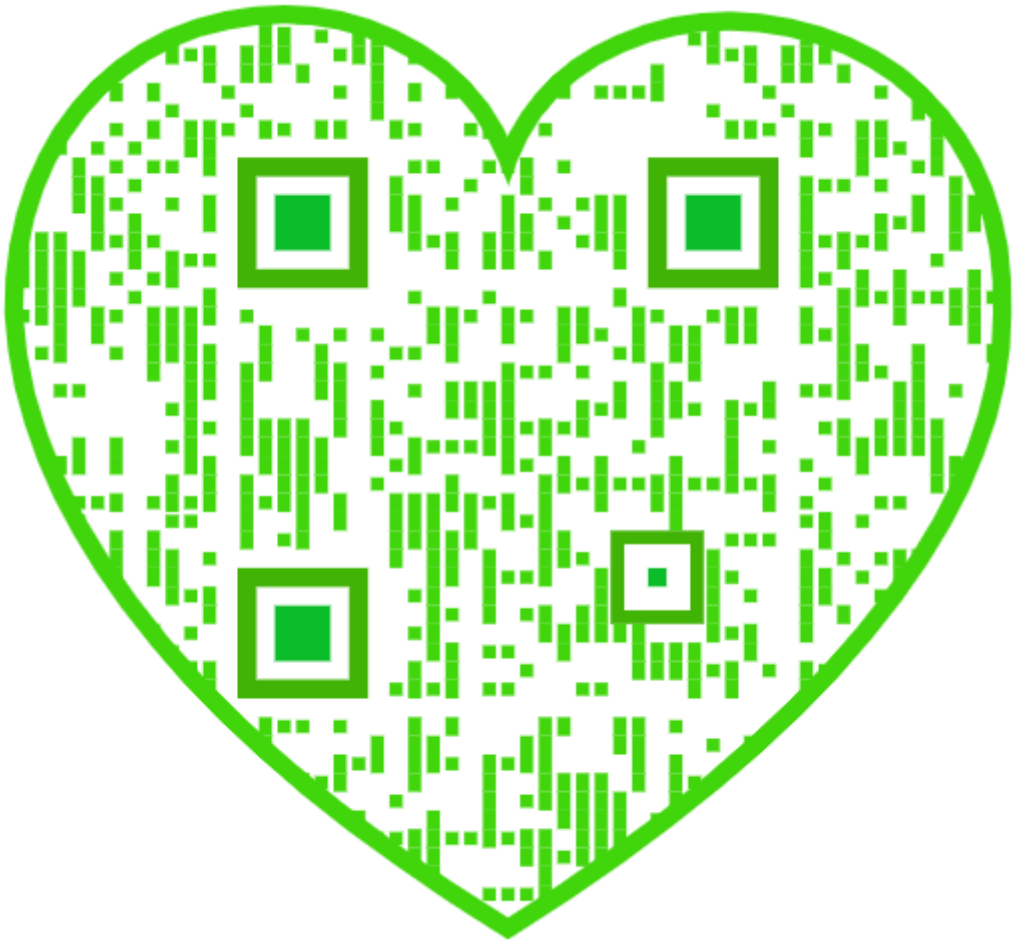
More Great Projects

- Toy Truck Two-fer p.60
- Shaker Hall Bench p.68
- Bandsaw Blade Organizer p.14
- Desk Clock p.17
- and more!

Learn Picture Framing Secrets From a Pro p.55

37 Shop Tips Inside!

Save BIG Bucks with the 5 Best Benchtop Tools p.74



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- HUGE PARTS FACILITY WITH OVER 1 MILLION PARTS IN STOCK AT ALL TIMES
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10" HYBRID TABLE SAW

BEAUTIFUL WHITE COLOR!

- Motor: 2 HP, 110V/220V, single-phase
- Precision ground cast iron table with wings measures: 27" x 40"
- Arbor: 5/8" • Arbor speed: 3850 RPM
- Capacity: 3 1/8" @ 90°, 2 3/16" @ 45°
- Rip capacity: 30" R, 12" L
- Quick change riving knife
- Cast iron trunnions
- Approx. shipping weight: 354 lbs.

INCLUDES BOTH REGULAR & DADO BLADE INSERTS

G0715P INTRODUCTORY PRICE **$765.00** $89 shipping ANYWHERE IN LOWER 48 STATES

17" HEAVY-DUTY BANDSAW

BEAUTIFUL WHITE COLOR!

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 17" sq.
- Table tilt: 10° L, 45° R
- Cutting capacity/throat: 16 1/4"
- Max. cutting height: 12 1/8"
- Blade size: 131 1/2" L (1/8" - 1" W)
- Blade speeds: 1700 & 3500 FPM
- Quick release blade tension lever
- Approx. shipping weight: 342 lbs.

Product Reviews & Awards ONLINE grizzly.com

INCLUDES DELUXE EXTRUDED ALUMINUM FENCE, MITER GAUGE & 1/2" BLADE

$89 shipping ANYWHERE IN LOWER 48 STATES

G0513P INTRODUCTORY PRICE **$795.00**

10" LEFT-TILTING CONTRACTOR-STYLE TABLE SAW *with Riving Knife*

- Motor: 1 3/4 HP, 110V/220V, single-phase
- Precision ground cast iron table w/wings
- Table size: 27" x 44" • Arbor: 5/8"
- Arbor speed: 4200 RPM
- Capacity: 3 1/8" @ 90°, 2 1/4" @ 45°
- Rip capacity: 36" R, 12" L • Approx. shipping weight: 342 lbs.

FREE 10" CARBIDE-TIPPED BLADE

CAST IRON TRUNNIONS & CAST IRON MITER GAUGE

MADE IN ISO 9001 FACTORY!

G0713 INTRODUCTORY PRICE **$850.00** $89 shipping ANYWHERE IN LOWER 48 STATES

10" LEFT-TILTING TABLE SAWS *with Riving Knife & Cast Iron Router Table*

- Motor: 3 HP or 5 HP, 220V, single-phase
- Precision ground cast iron table size with wings: 27" x 48"
- Arbor: 5/8"
- Cutting capacity: 25 5/8" R, 8" L
- Max. depth of cut: 3" @ 90°, 2 1/8" @ 45°
- Approx. shipping weight: 546 lbs.

Product Reviews & Awards ONLINE grizzly.com

FREE 10" CARBIDE-TIPPED BLADE

$139 shipping ANYWHERE IN LOWER 48 STATES

G1023RLW *3 HP* ~~$1175.00~~ **SALE $1145.00**

G1023RLWX *5 HP* ~~$1295.00~~ **SALE $1225.00**

10" CABINET TABLE SAW *with Riving Knife & Extension Rails*

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table
- Table size with extension: 27" x 74 3/4"
- Arbor: 5/8" • Arbor speed: 4300 RPM
- Max. depth of cut: 3 1/8" @ 90°, 2 3/16" @ 45°
- Max. rip capacity: 50"
- Max. dado width: 13/16"
- Approx. shipping weight: 572 lbs.

WOOD MAGAZINE TOP VALUE APPROVED 2009

3 HP LEESON® MOTOR!

Product Reviews & Awards ONLINE grizzly.com

G0691
Reg. ~~$1395.00~~
SALE $1350.00

FREE 10" CARBIDE-TIPPED BLADE

$139 shipping ANYWHERE IN LOWER 48 STATES

MADE IN ISO 9001 FACTORY!

14" BANDSAW

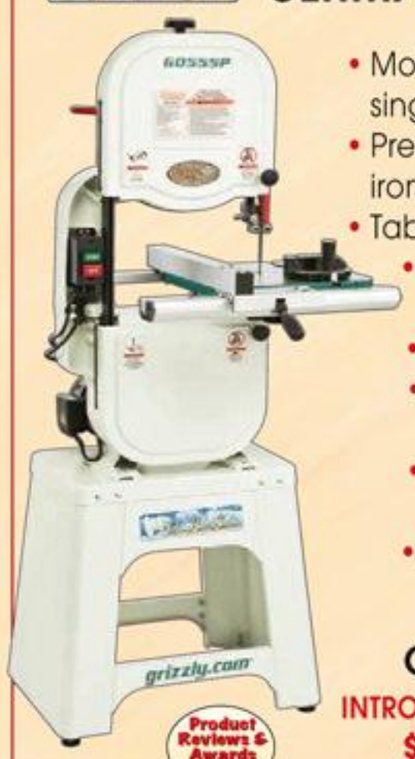
- Motor: 3/4 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 14" sq.
- Table tilt: 15° L, 45° R
- Cutting capacity/throat: 13 1/2"
  - Max. cutting height: 6"
  - Blade size: 92 1/2" - 93 1/2" L (1/8" - 3/4" W)
- Blade speed: 3000 FPM
- Cast iron frame
- Steel open frame stand
- Approx. shipping weight: 165 lbs.

CAN BE PLUGGED INTO ANY STANDARD HOUSEHOLD OUTLET

G0580
Reg. ~~$395.00~~
SALE $375.00

$69 shipping ANYWHERE IN LOWER 48 STATES

ULTIMATE 14" BANDSAW



Product Reviews & Awards ONLINE grizzly.com

- Motor: 1 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 14" sq.
- Table tilt: 10° L, 45° R
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Blade size: 92 1/2" - 93 1/2" L (1/8" - 3/4" W)
- Blade speeds: 1500 & 3200 FPM
- Approx. shipping weight: 196 lbs.

MADE IN ISO 9001 FACTORY!

G0555P
INTRODUCTORY PRICE
$425.00

$69 shipping ANYWHERE IN LOWER 48 STATES

19" HEAVY-DUTY EXTREME SERIES BANDSAW

EXTREME SERIES

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 26 3/4" x 19"
- Table tilt: 5° L, 45° R
- Cutting capacity/throat: 18 1/4"
- Max. cutting height: 12"
  - Blade size: 143" L (1/8" - 1 1/4" W)
  - Blade speeds: 1700 & 3500 FPM
  - Approx. shipping weight: 460 lbs.

DELUXE RE-SAW FENCE INCLUDED

MADE IN ISO 9001 FACTORY!

G0514X ~~$1250.00~~ **SALE $1195.00** $89 shipping ANYWHERE IN LOWER 48 STATES

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Huge Price Increases on Materials & Labor Overseas
BUY NOW TO SECURE PRICES

12" JOINTER/PLANER COMBINATION MACHINE

New!

BEAUTIFUL WHITE COLOR!

- Motor: 5 HP, 220V, single-phase
- Jointer table size: 14" x 59½"
- Cutterhead dia.: 3⅛"
- Cutterhead speed: 5034 RPM
- Max. jointer depth of cut: ⅛"
- Max. width of cut: 12"
- Planer feed rate: 22 FPM
- Max. planer depth of cut: ⅛"
- Max. planer cutting height: 8"
- Planer table size: 12¼" x 23⅛"
- Approx. shipping weight: 734 lbs.

NEW END-MOUNTED FENCE

CARBIDE INSERT SPIRAL CUTTERHEAD!

FREE SAFETY PUSH BLOCKS

$139 Shipping ANYWHERE IN LOWER 48 STATES

G0634XP INTRODUCTORY PRICE **$2195.00**

ALSO AVAILABLE

G0633 JOINTER/PLANER ~~$1995.00~~ **ONLY $1750.00**

G0634Z SPIRAL CUTTERHEAD MODEL ~~$2495.00~~ **ONLY $2250.00**

CYCLONE DUST COLLECTOR

BEAUTIFUL WHITE COLOR!

New!

- Motor: 1½ HP, 110V/220V, single-phase, TEFC, 3450 RPM
- Air suction capacity: 775 CFM
- Static pressure at rated CFM: 1.08"
- Intake port: 6" with included 5" optional port
- Impeller: 13½"
- Height: 68½"
- Built-in remote control switch
- Approx. shipping weight: 210 lbs.

PLEATED FILTER IS PROTECTED BY A STEEL CAGE

FULLY MOBILE WITH BUILT-IN CASTERS

ONLY 68½" TALL!

$69 Shipping ANYWHERE IN LOWER 48 STATES

G0703P INTRODUCTORY PRICE **$695.00**

8" JOINTERS

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 9" x 72½"
- Max. depth of cut: ⅛"
- Max. rabbeting depth: ½"
- Cutterhead dia.: 3"
- Cutterhead speed: 5000 RPM
- Cuts per minute: 20,000
- Approx. shipping weight: 500 lbs.

FREE SAFETY PUSH BLOCKS

BUILT-IN MOBILE BASE

CHOOSE EITHER 4 HSS KNIVES OR SPIRAL CUTTERHEAD MODEL

G0656P INTRODUCTORY PRICE **$775.00**

$139 Shipping ANYWHERE IN LOWER 48 STATES

WITH SPIRAL CUTTERHEAD
G0656PX INTRODUCTORY PRICE **$1075.00**

12" x 60" SHORT BED JOINTER *with Spiral Cutterhead*

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 13" x 60"
- Fence: 5⅜" x 31¼"
- Cutterhead dia.: 3¾"
- Cutterhead speed: 4,950 RPM
- Bevel jointing: 45°, 90°, 135°
- Max. depth of cut: ⅜"
- Approx. shipping weight: 832 lbs.

FREE SAFETY PUSH BLOCKS

MADE IN ISO 9001 FACTORY!

PARALLELOGRAM TABLE ADJUSTMENT

$169 Shipping ANYWHERE IN LOWER 48 STATES

G0706 ~~$2195.00~~ **SALE $2150.00**

15" PLANERS

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 660 lbs.

BUILT-IN MOBILE BASE

CHOOSE EITHER 3 KNIFE OR SPIRAL CUTTERHEAD MODEL

$139 Shipping ANYWHERE IN LOWER 48 STATES

G0453P INTRODUCTORY PRICE **$995.00**

WITH SPIRAL CUTTERHEAD
G0453PX INTRODUCTORY PRICE **$1475.00**

10" DRUM SANDER

New!

- Motor: 1½ HP, 110V, single-phase
- Conveyor motor: 1/10 HP
- Drum speed: 2300 FPM
- Drum size: 5⅛" x 10"
- Max. sanding width: 10"
- Max. workpiece height: 2 15/16"
- Min. workpiece height: 3/16"
- Variable feed speeds: 1-10 FPM
- 4" dust port
- Approx. shipping weight: 220 lbs.

WHEELS & STOWABLE TRANSPORT HANDLES FOR MOBILITY

REMOVABLE HEADSTOCK SUPPORT BRACKET ALLOWS SANDING UP TO 20"

G0716 INTRODUCTORY PRICE **$345.00**

$69 Shipping ANYWHERE IN LOWER 48 STATES

15" DISC SANDER *with Stand*

New!

- Motor: 1½ HP, 220V, single-phase, 1720 RPM
- Cast iron sanding disc size: 15"
- Cast iron table size: 12" x 20"
- Table tilt: 0 - 45°
- Floor to table height: 37⅝"
- Dust port: 2½"
- Approx. shipping weight: 232 lbs.

INCLUDES MITER GAUGE

MADE IN TAIWAN

FEATURES BUILT-IN MOTOR BRAKE & STORAGE CABINET WITH SHELF

G0719 INTRODUCTORY PRICE **$795.00**

$69 Shipping ANYWHERE IN LOWER 48 STATES

1 HP WALL MOUNT DUST COLLECTOR

- Motor: 1 HP, 110V/220V,single-phase
- Amps: 14/7
- Intake size: 4"
- Bag size (dia. x depth): 13½" x 24"
- Balanced steel, radial fin impeller
- Air suction cpacity: 450 CFM
- Max. static pressure: 7.2"
- Approx. shipping weight: 51 lbs.

SPECIAL WALL MOUNT DESIGN!

New!

EASY MOUNTING WALL BRACKET & LOCKING THUMB SCREW SECURES DUST COLLECTOR IN PLACE!

G0710
INTRO PRICE
$169.95

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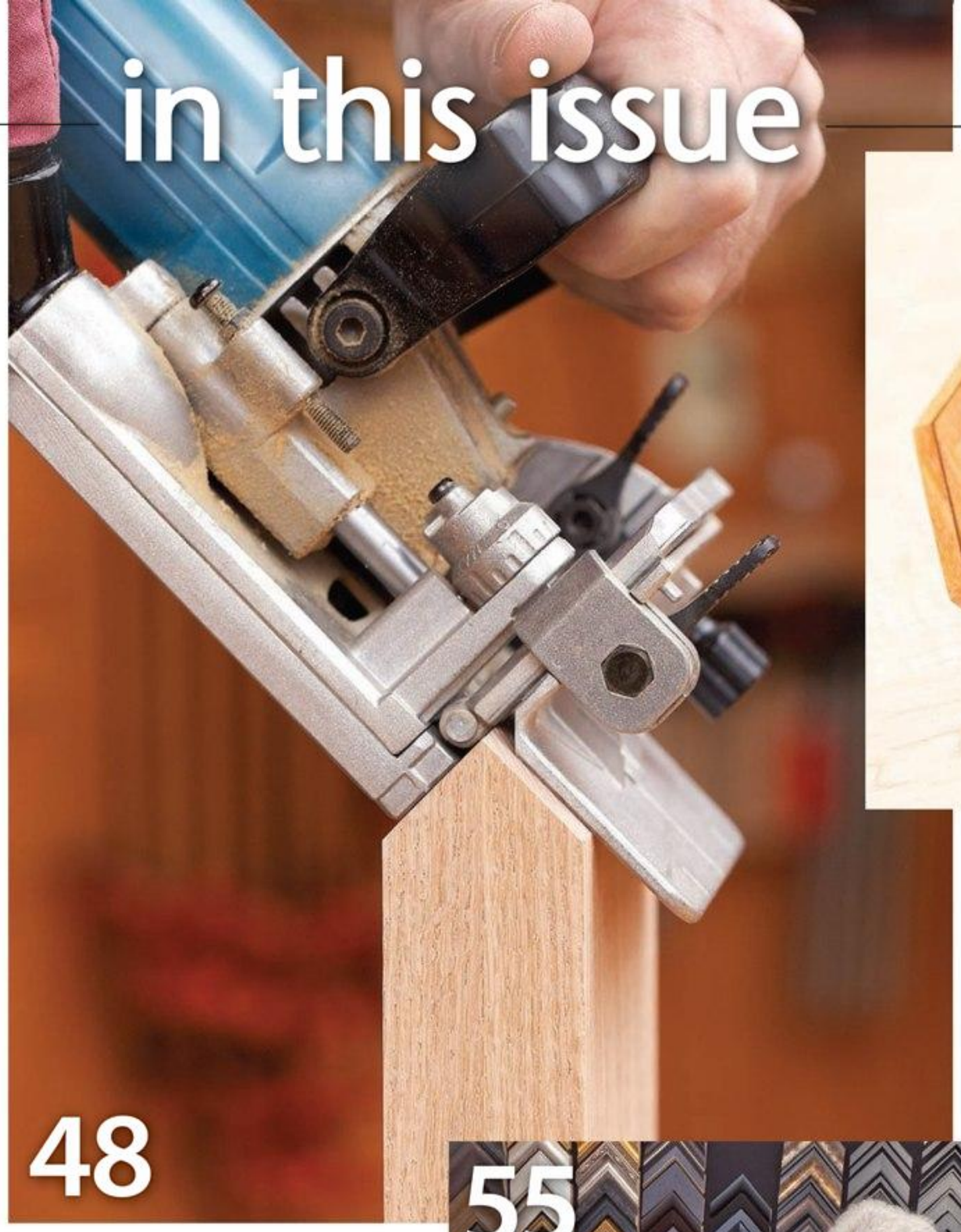

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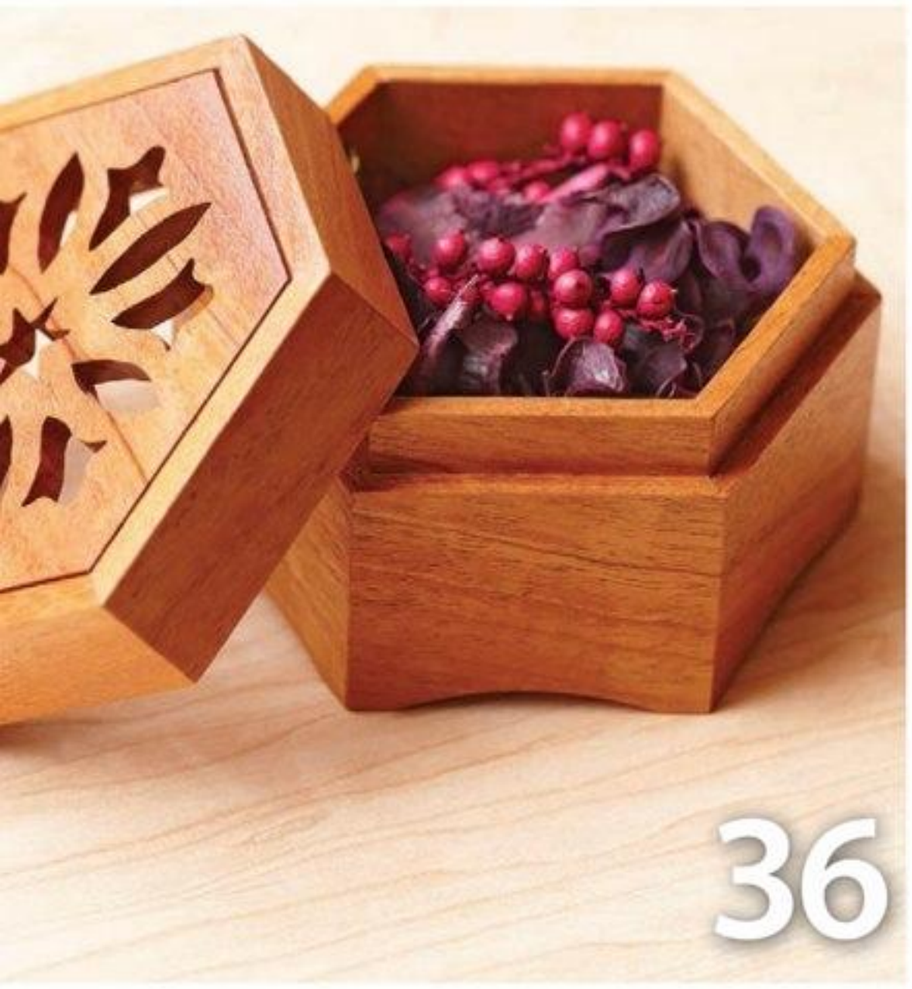

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QUESTIONS ANSWERED, 24/7

Got a woodworking question that can't wait? Post it at woodmagazine.com/forums and get quick answers from your fellow woodworkers.

Top Kudoed Posts

Front Porch Rockers	6
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Entertainment center all done	4
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Title	Posts	New	Latest Post
General Woodworking Latest Post - Re: mattress sizes	33077	33077	42 minutes ago by nate2282
Tools and Tool Buying Latest Post - Re: 4" delta jointer	14185	14185	11 minutes ago by gruhe
Info Sharing Latest Post - Re: Glue Expiration Dates	467	467	Saturday by hankm
Finishing and Refinishing Latest Post - Re: Need recommendation for a dark distressed finish	4908	4908	3 hours ago by Allen O.
Wood Turning Latest Post - Thanks to Charles	4076	4076	an hour ago by Marlen at WO...

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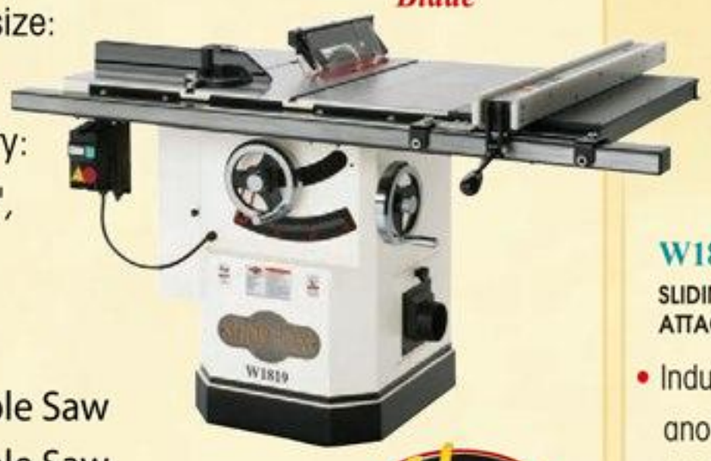
2 YEAR WARRANTY

SHOP FOX® machines are backed by a 2 Year Warranty!

10" TABLE SAWS with Riving Knife

Free 10" Carbide-Tipped Blade

- 3 HP, 220V, single-phase motor
- Cast iron table size: 27" x 40¼"
- Max. rip capacity: (W1819) 29½", (W1820) 50"



W1819 10" Table Saw
W1820 10" Table Saw w/Long Ext. Table

New

SLIDING TABLE and ROUTER TABLE ATTACHMENTS for W1819 & W1820

SAW NOT INCLUDED

New

W1821 SLIDING TABLE ATTACHMENT

- Industrial grade anodized aluminum table size: 47" x 9"
- Max. cross cut: 48"

W1822 ROUTER TABLE ATTACHMENT

- Precision ground cast iron table size: 27" x 20"
- Universal router mount

3 HP LOW PROFILE CYCLONE DUST COLLECTOR

New

- Motor: 3 HP, 220V, single-phase, TEFC class "F", 3450 RPM
- Air suction capacity: 1489 CFM
- Filter: 0.2-2 microns
- 55 gal. steel collection drum with casters

Only 80" Tall!

W1816 Cyclone Dust Collector

VARIABLE SPEED PLANER/MOULDER with Stand

New

- Motor: 2 HP, 220V, single-phase
- Precision ground cast iron table with wings: 36¼"L x 10"W
- Max. cutting width: 7"
- Max. planing height: 7½"
- Max. moulding depth: ¾"

We also carry an extensive selection of moulding knives for this machine!

W1812 Planer/Moulder

10" SLIDING TABLE SAW

New

- 5 HP, 220V, single-phase motor
- Precision ground cast iron table measures 47" x 40" with extension
- Sliding table measures 63" x 12¼"

BLADES NOT INCLUDED

Scoring blade eliminates cross grain tearout!

W1811 10" Sliding Table Saw

8" JOINTER with Parallelogram Adjustable Beds

- 3 HP, 220V, single-phase, TEFC motor
- Precision ground cast iron parallelogram design table measures 8" x 76⅝"
- Cutterheads: (W1741) 4 HSS knives (W1741S) spiral

Built-in Mobile Base

W1741 8" Jointer
W1741S with Spiral Cutterhead

OUTSTANDING SHOP FOX® ACCESSORIES

ADJUSTABLE MOBILE BASES

STRONGER FRAME WITH IMPROVED WHEELS AND GUSSETED SUPPORTS!

D2260A Mini Mobile Base 600 lb. capacity

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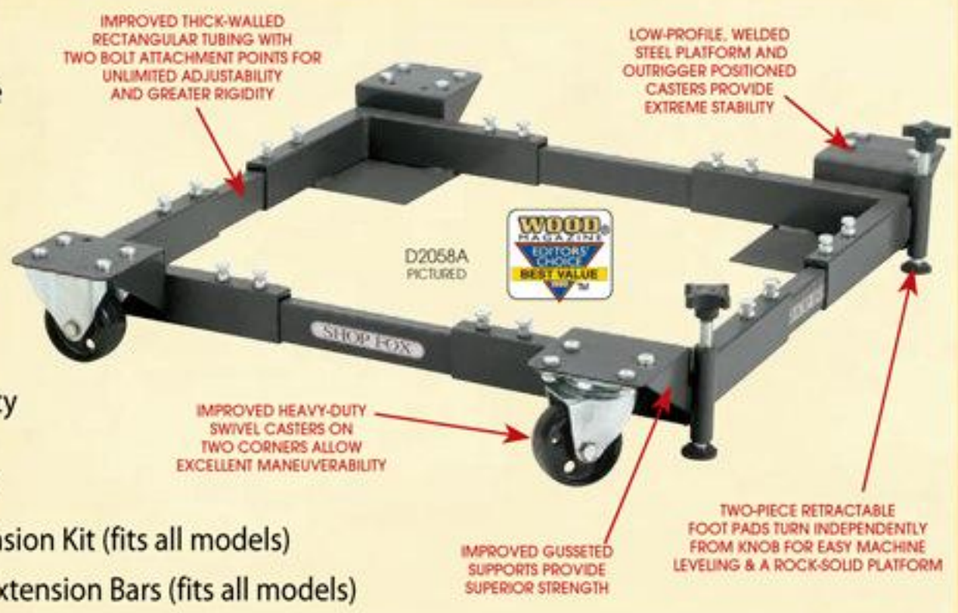
D2058A Super Heavy-Duty Mobile Base 1300 lb. capacity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Set jointer knives in perfect alignment every time!

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W1210 Polycarbonate jig for 4" - 8" jointers w/HSS knives
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Self-adhesive measuring tape & adjustable magnified cursor for quick positioning.

W1716 Aluma-Classic® Fence w/standard 57" rails
W1720 Aluma-Classic® Fence w/long 79" rails & legs (50" cutting capacity)
W1721 79" rails & legs (fence not included)
W1722 Set of 3 powder coated sheet metal wings

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July 2011 | Vol. 28, No. 3 | Issue No. 205

What is the most important rule in your shop?

EDITOR-IN-CHIEF
BILL KRIER — Return tools to where they belong.

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Don't startle or surprise me.

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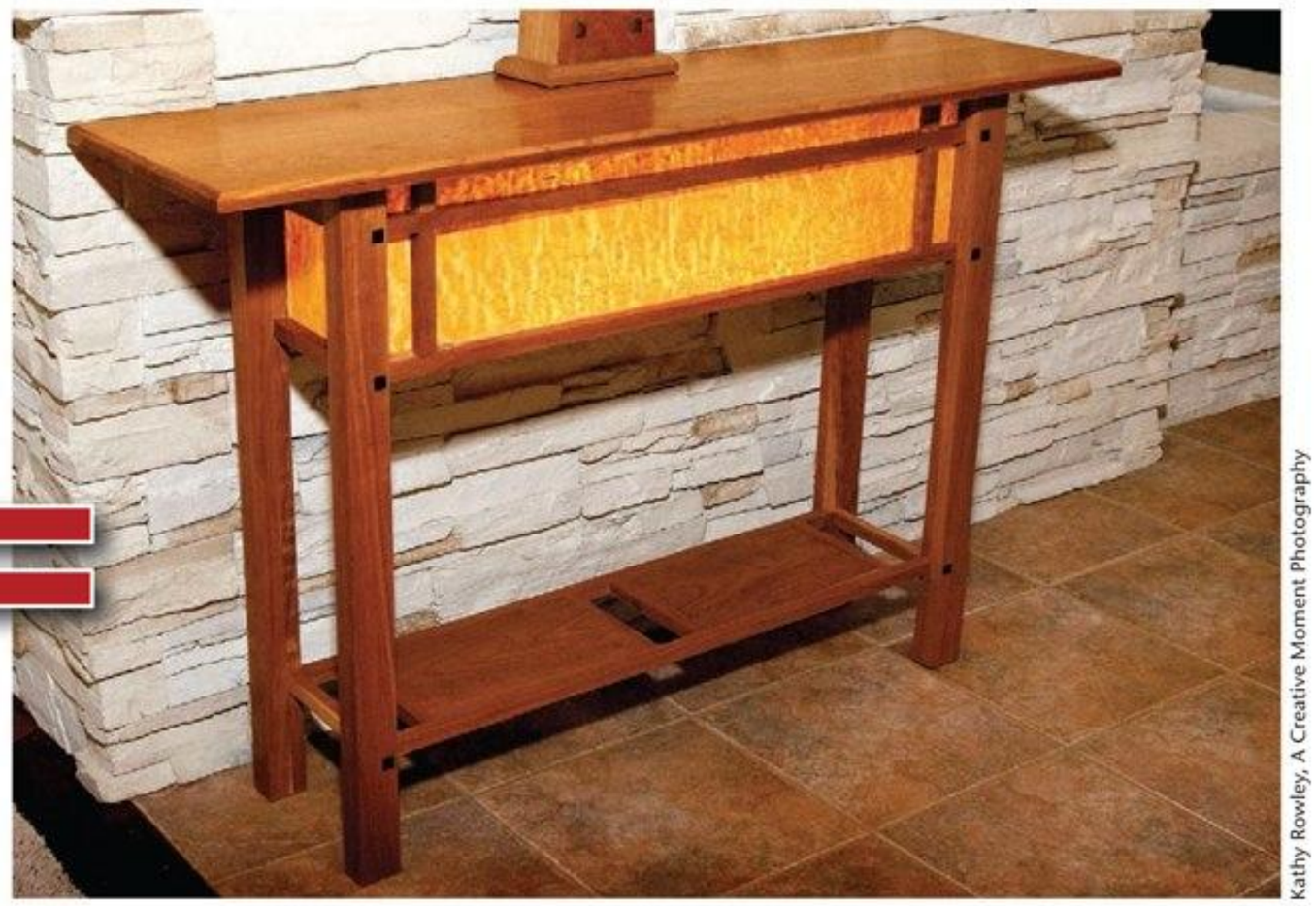
A light? A table? Make mine a lighted table

I liked two recent *WOOD®* magazine projects so much that I combined them into one. The resulting table at *right* is a hybrid of the Luminous Display Pedestal from issue 200 (October 2010) and the Hall Table in issue 199 (September 2010). I built my table from curly cherry with quilted maple veneer to cover the panels. The electric cord for the light hides in a groove in one of the back legs. Thanks for the inspiration!

—Bruce Dikeman, Colorado Springs, Colo.

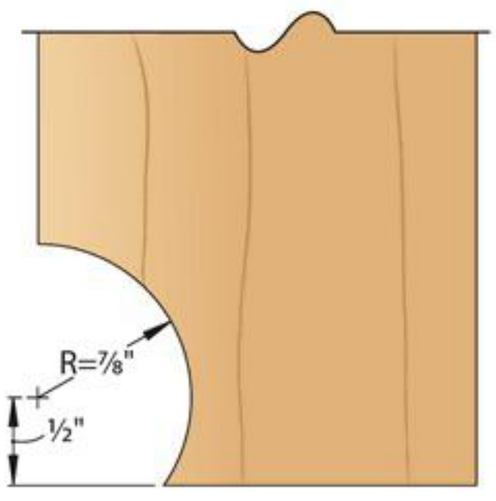


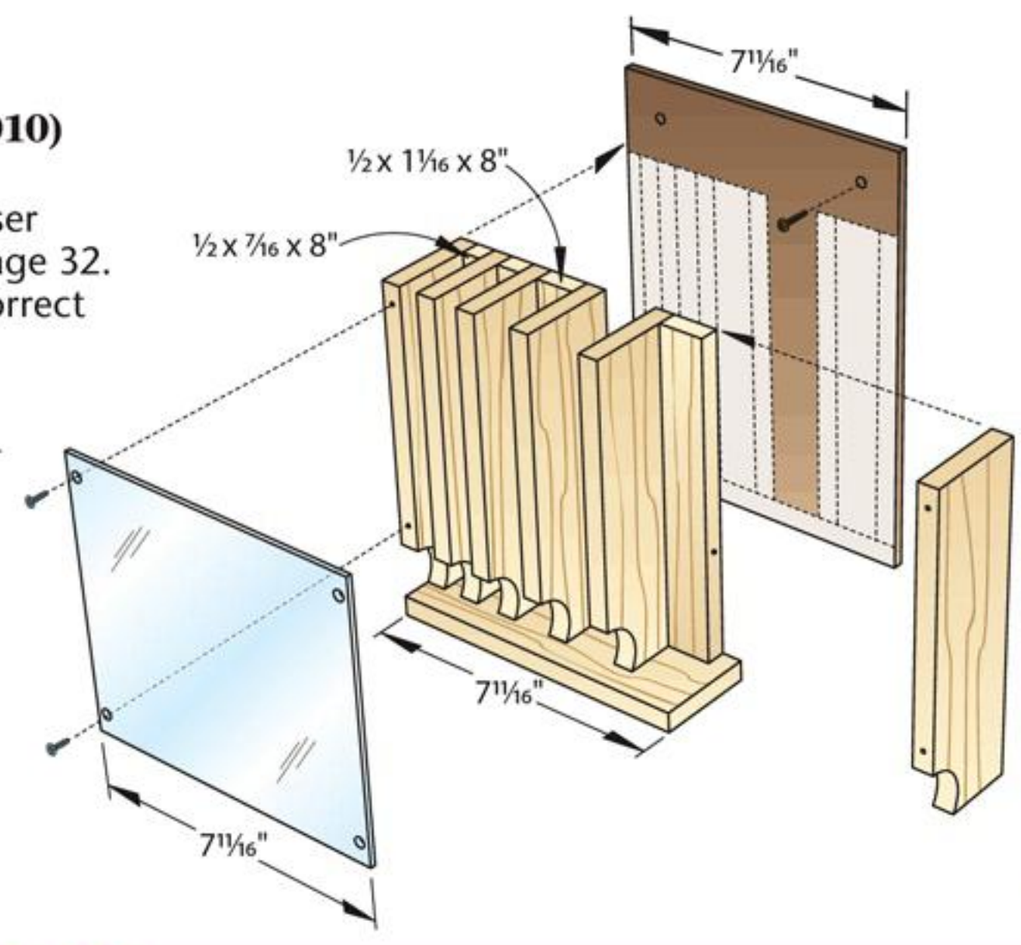
Kathy Rowley, A Creative Moment Photography

Article updates

Issue 201 (November 2010)

■ A few dimensions on the Drop-Down Battery Dispenser were listed incorrectly on page 32. These drawings show the correct dimensions.





Issue 202 (December/January 2010/2011)

■ The copper cap for the Gumball Machine on page 53 should be ¾" I.D.

Please work safely

In order to show you precise details in photos, we frequently remove safety guards. In your work, be sure to use all safety devices, as well as wearing vision, breathing, and hearing protection.

—WOOD magazine editors

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More tips for building better birdhouses

In my studies as a wildlife and plant biologist, I have researched all aspects of making homes for birds and have built many birdhouses to keep them safe and healthy. On page 79 of issue 202 (December/January 2010/2011) you list appropriate opening sizes for birdhouses, but I'd like to suggest some additional details.

First, build birdhouses from lumber at least ¾" thick to provide insulation from extreme temperatures. In addition to the opening, bore a few small ventilation holes in the bottom or top of the sides. The interior surface near the entry hole needs to be rough so the birds, particularly young ones leaving the nest, can get a good foothold while climbing out.

Locate the birdhouses properly, keeping in mind exposure to wind, rain, sun, and the birds' preferred habitat. For example, bluebirds like wide open fields, while wrens prefer bushy areas. And for best results, maintain the houses to ensure wasps and house sparrows stay out, and clean out old nests and parasites at the end of every season.

Most importantly, protect the houses from predators, as many animals enjoy the easy meal of bird eggs or babies. For more info, go to tinyurl.com/34rk6kf.

—Lance Gardner, Virginia Institute of Marine Science, Gloucester Point, Va.

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Shop Tips

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Top Shop Tip

Press-on, peel-off to transfer patterns

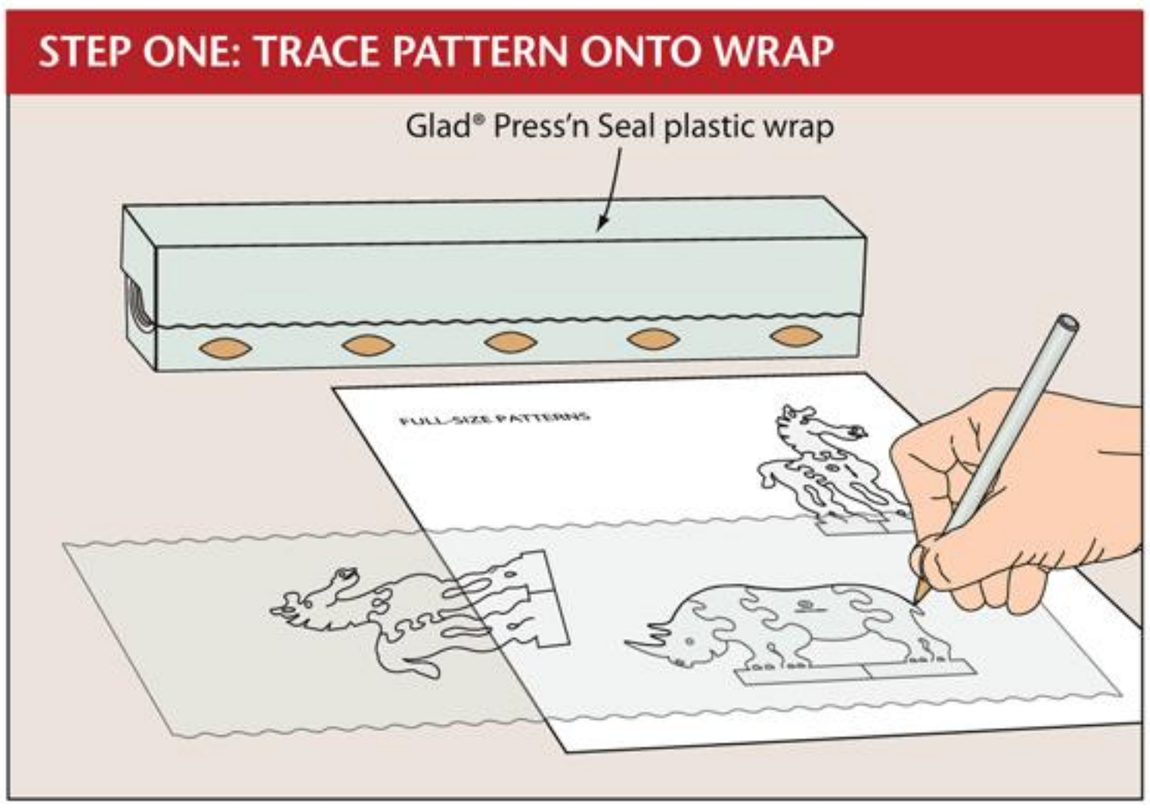
I've found a method for transferring patterns to wood that doesn't destroy the paper pattern or make a mess of the wood. The solution lies with a kitchen product called Glad Press'n Seal®. (Find it with the aluminum foil and plastic wraps.)

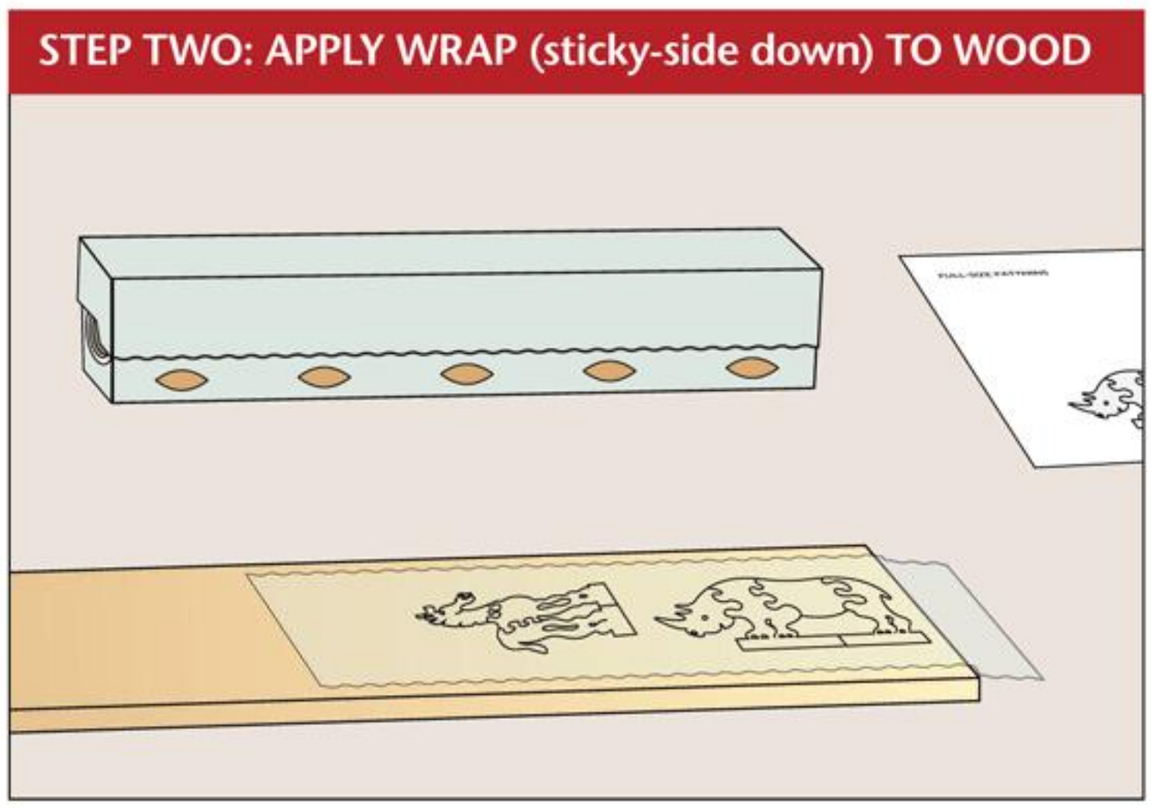
Simply peel a length of the film off the roll, press it—sticky-side down—to the paper pattern, and trace the pattern with a ball-point pen or a fine-point felt-tip marker. Then peel the film from the pattern, press it onto the wood blank, and cut away. When you're finished, just peel off the film. No need for solvents or scraping.

—Henry Blechl, Vista, Calif.

Photo: Andrea Mahady, Photography by Drea

For sending in this issue's Top Shop Tip, Henry gets a pair of 60" Bessey K-Body REVO VARIOs, along with 24" and 40" pairs of Bessey K-Body REVOs. Attaboy, Henry!





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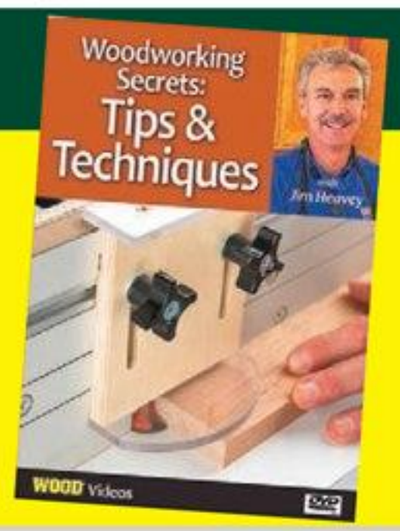

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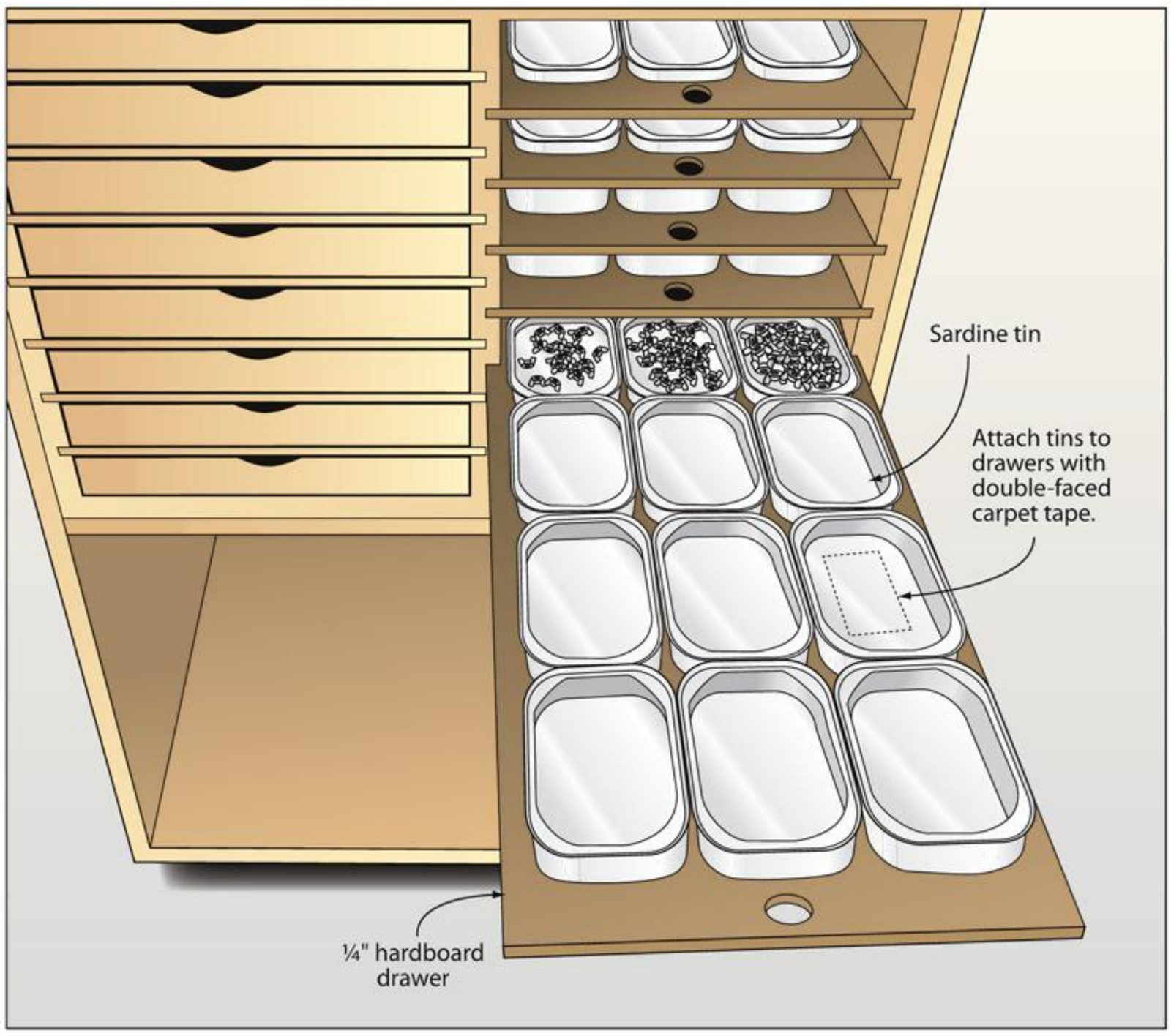
Nothing fishy about these hardware bins

Here's my take on a low-dough hardware storage system. This cabinet has hardboard drawers that ride in ¼" slots. Sardine tins (thoroughly cleaned and any sharp edges filed, of course) double-face-taped to the drawers hold the hardware. Of course, if you don't like sardines as much as I do, you could substitute mint tins or inexpensive plastic food-storage containers.

—Serge Duclos, Delson, Que.



continued on page 10

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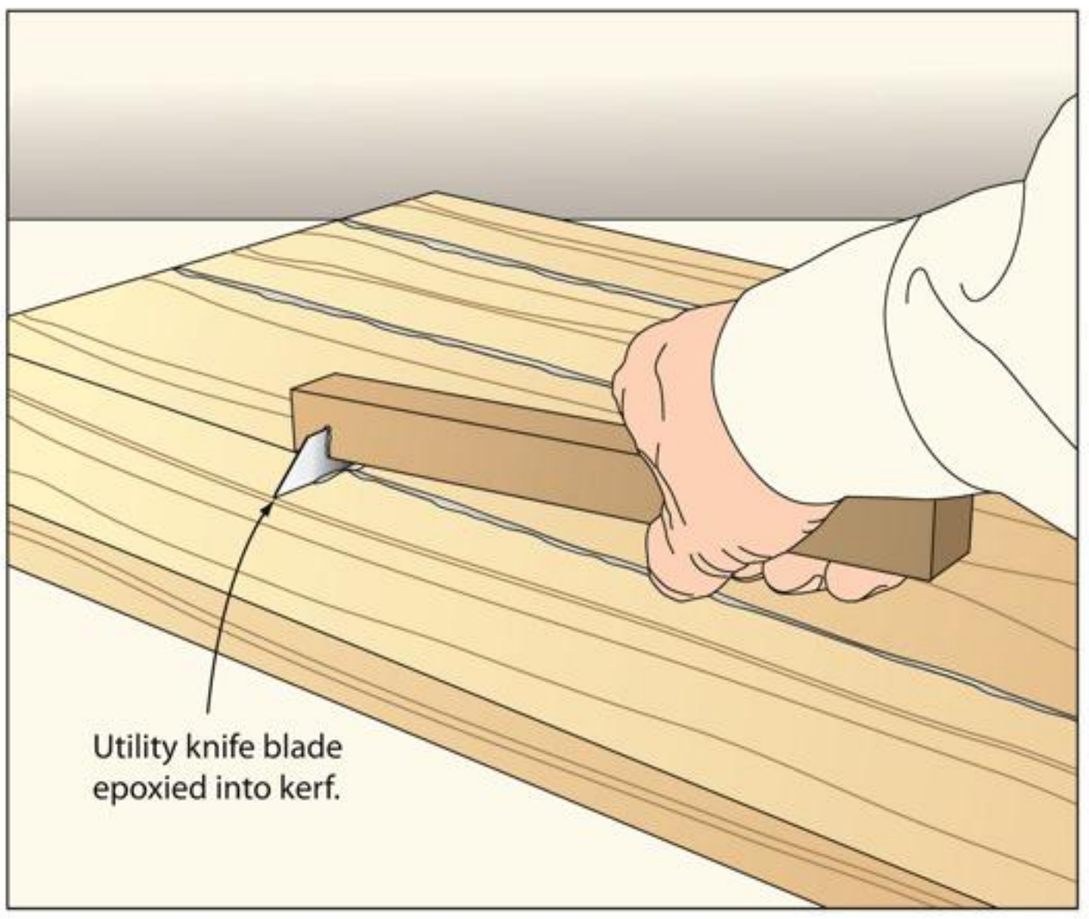
Shop Tips

Make a slim scraper from scrap

Here's a quick, disposable scraper that works great for cleaning up glue squeeze-out. Bandsaw a ½"-deep kerf in a scrap-stock "handle" at approximately a 15° angle. Then epoxy a utility knife blade into the kerf.

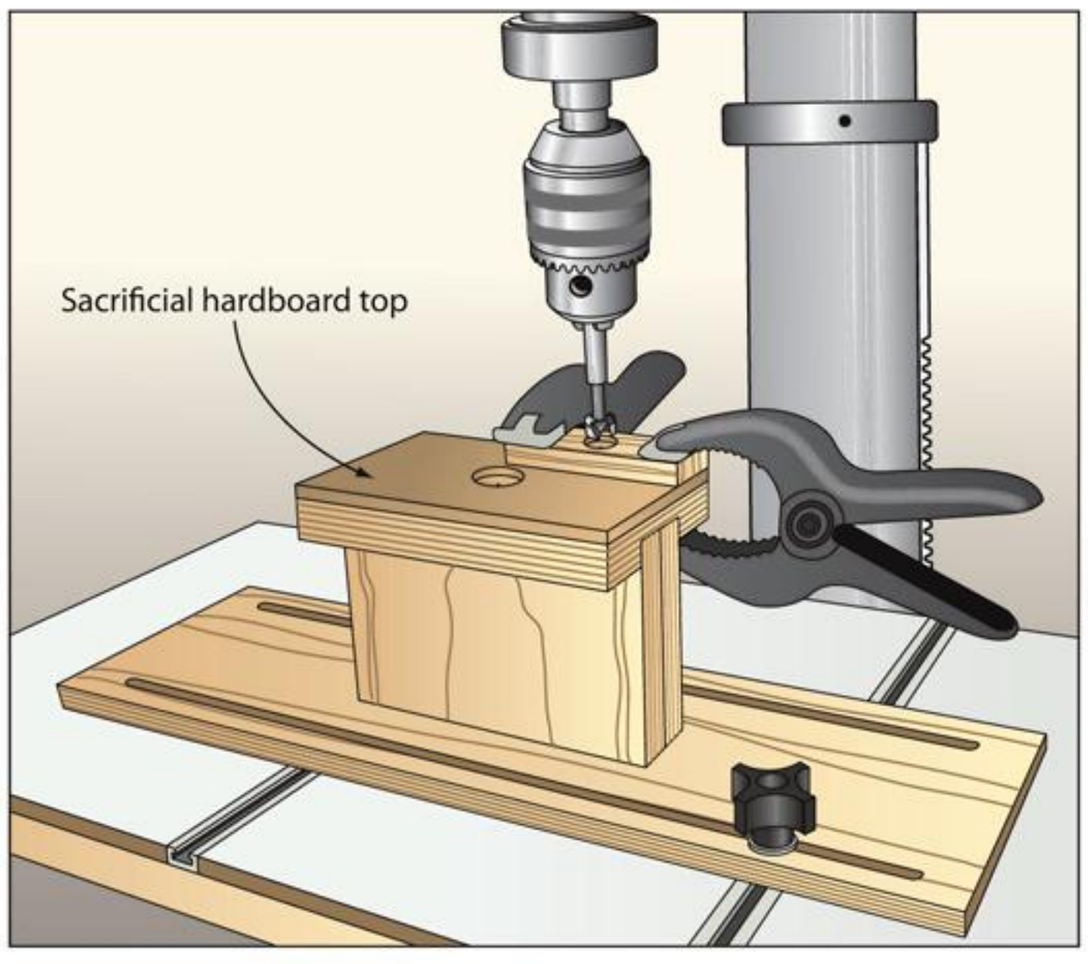
—Stan Liedman, Maple Grove, Minn.



Tiny table gets a grip on small parts

The smaller the part you drill on your drill press, the more important it is to clamp it for safety and accuracy. Ironically, the smaller the part, the more difficult it is to clamp to the table. My solution, this I-beam fixture, provides a tiny table to position and clamp most any small part. My drill-press auxiliary table has T-track already installed, so the slots on the fixture allow it to move in two dimensions; but you could also simply clamp the base of the fixture to your table. Hot glue a hardboard top to the fixture for a sacrificial surface that can be pried off once it's damaged.

—Len Urban, Rancho Mirage, Calif.



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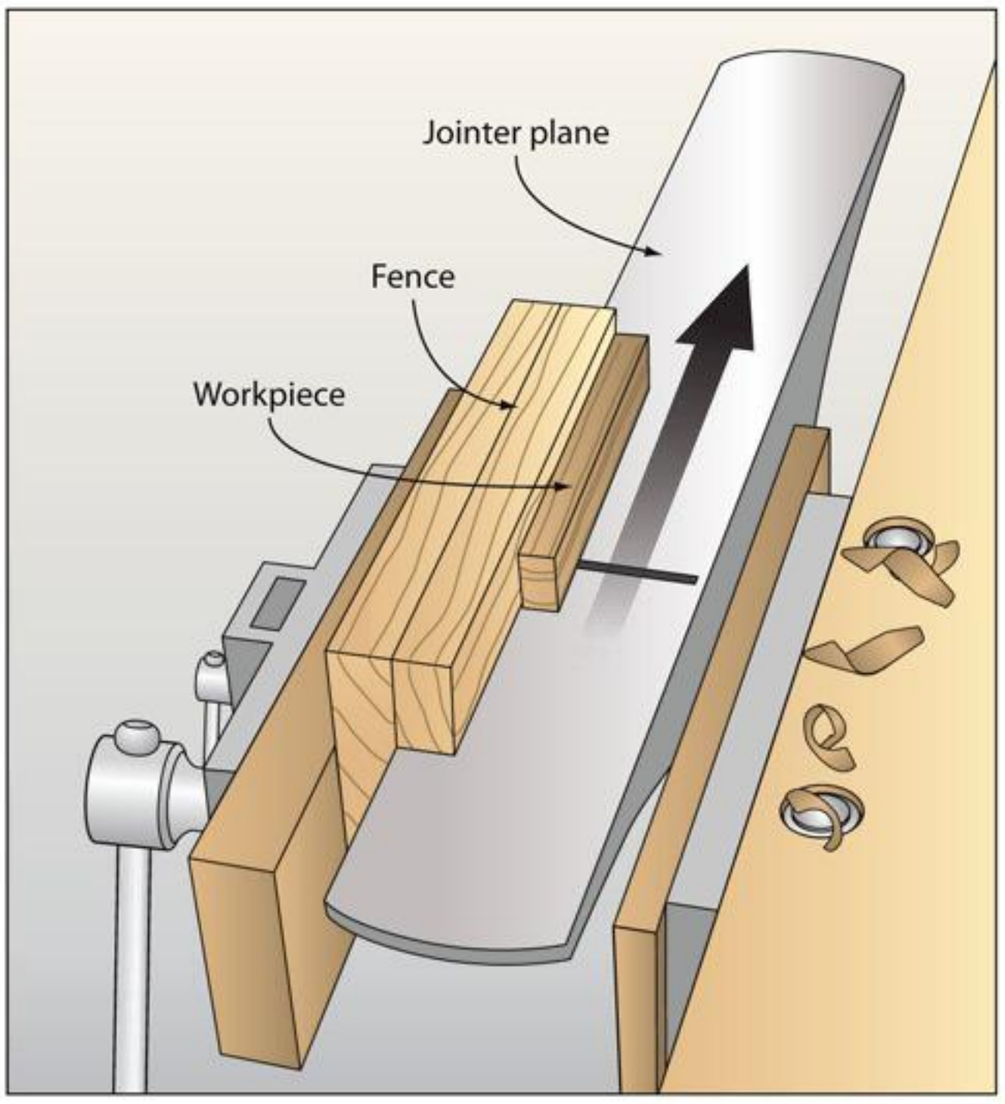
Smart and safe small-part square-up

When making boxes or small cabinets, squaring up small parts can be way too dangerous on the jointer. Instead, use this trick: Clamp a jointer plane upside down in your bench vise together with a shop-made wooden fence. Then joint the piece as you would with a power jointer—by running it against the fence and across the plane blade.

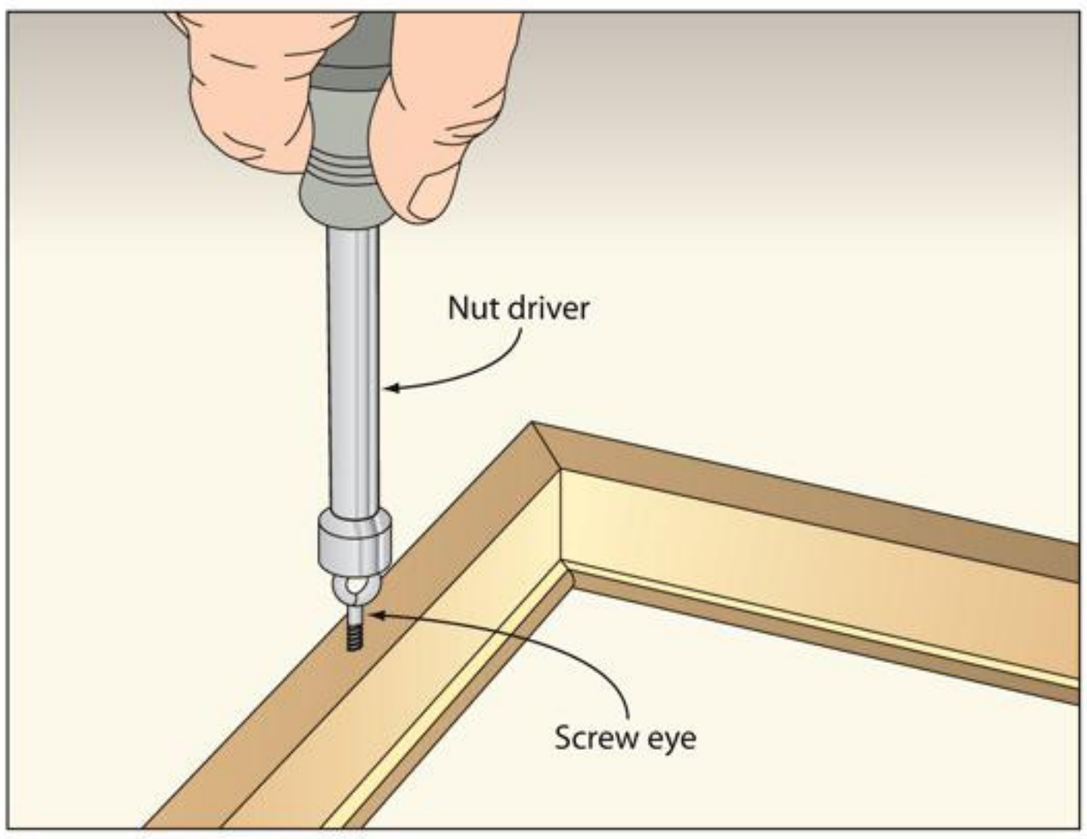
—Alejandro Balbis, Longueuil, Que.



Screw eyes driving you nuts? Use a nut driver

Using large fingers to install small screw eyes into picture frames can be frustrating at best, and painful at worst. For me, a set of nut drivers works well to drive the hardware into the wood.

—Robert Marchant, Deltona, Fla.



continued on page 12

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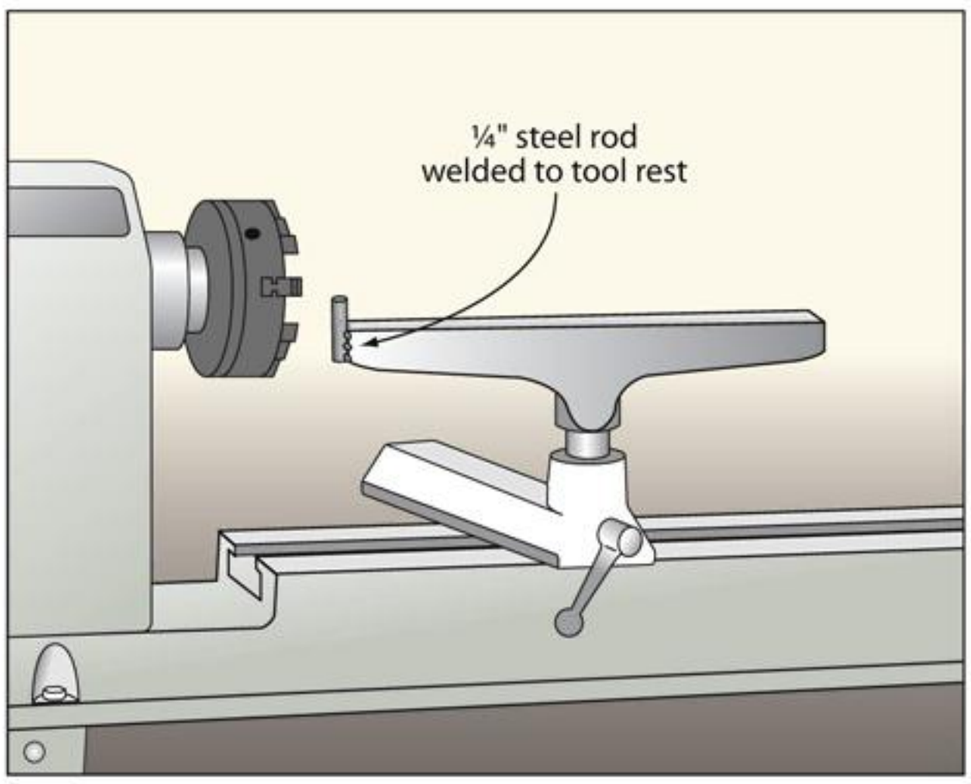
Tool stop ends chuck mishaps

To provide both a visual reference and a guard that prevents a turning tool from catching in spinning chuck jaws, I welded a ¼"-diameter steel rod to the end of my tool rest. As a beginning turner, this has added both safety and peace of mind.

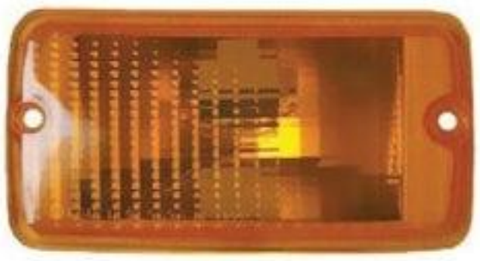
—Kenneth Cook, Plattsburgh, N.Y.



Put some extra spring in your grip

Often when you need to place a spring clamp, you only have one hand to spare. But with failing hand strength, I've found it increasingly difficult to open spring clamps one-handed. The solution: Before starting a glue-up, I use both hands to place the required number of clamps on a scrap of wood. With the clamps near their maximum capacity, as shown *below*, they are much easier to use one-handed.

—Len Urban, Rancho Mirage, Calif.



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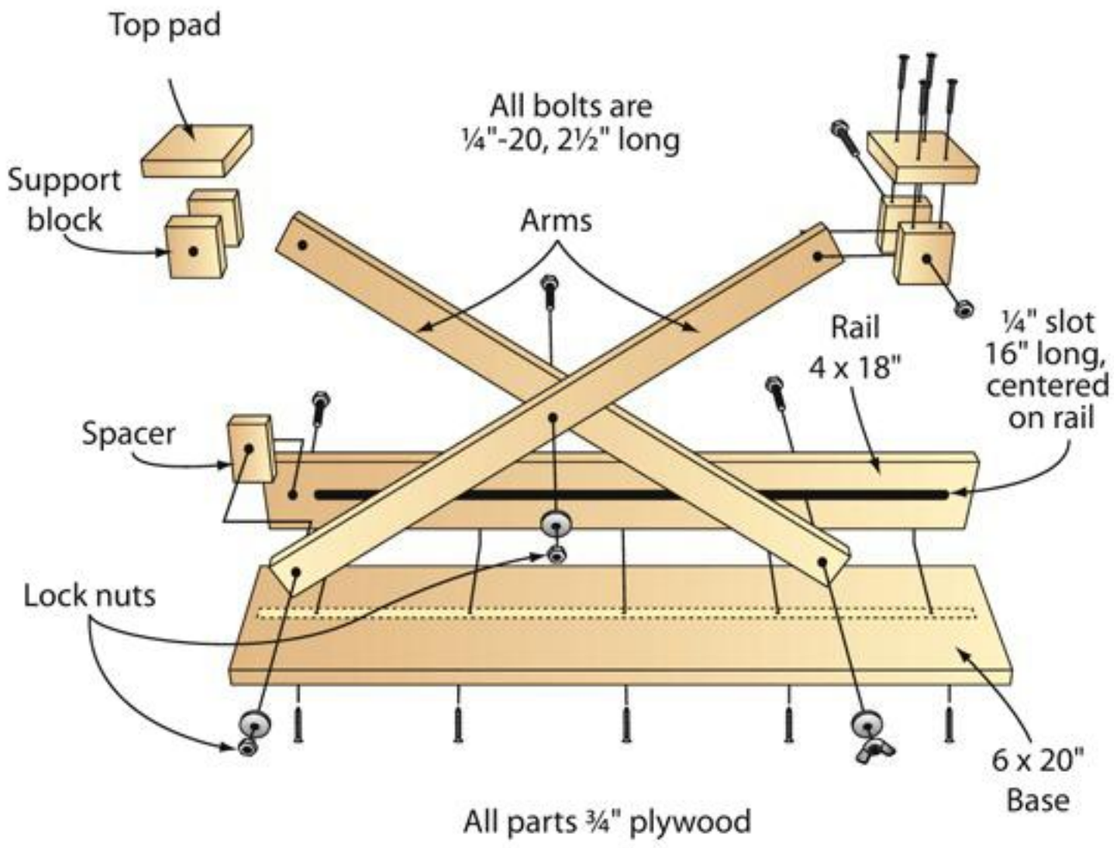
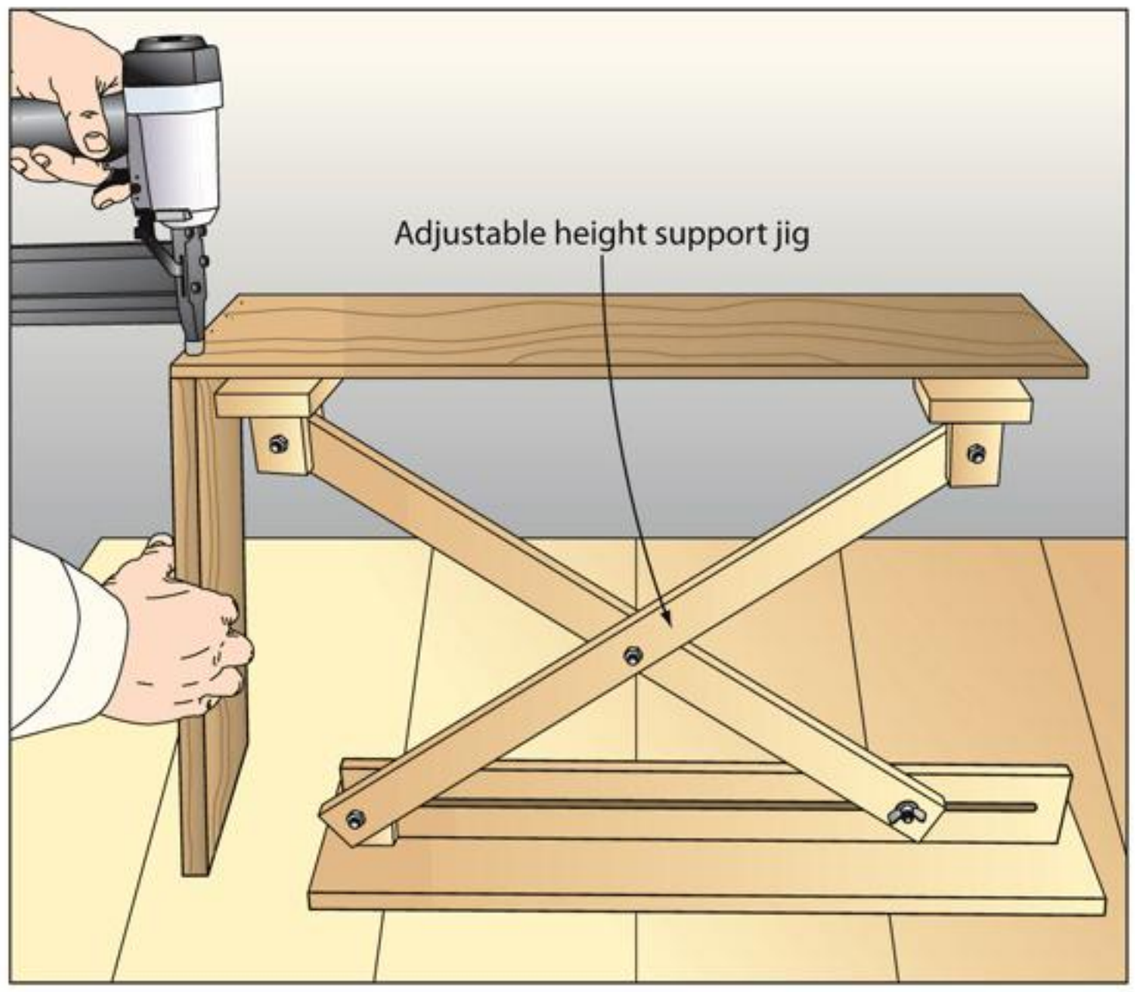
Scissor-lift support cuts need for a third hand

This adjustable-height support serves as an extra hand. It's especially useful for joining two parts where clamps would get in the way. With the lock nuts just loose enough to allow motion, the scissor action lets me adjust the support to the perfect height, and the wing nut locks it firmly in place.

—Charles Mak, Calgary, Alta.





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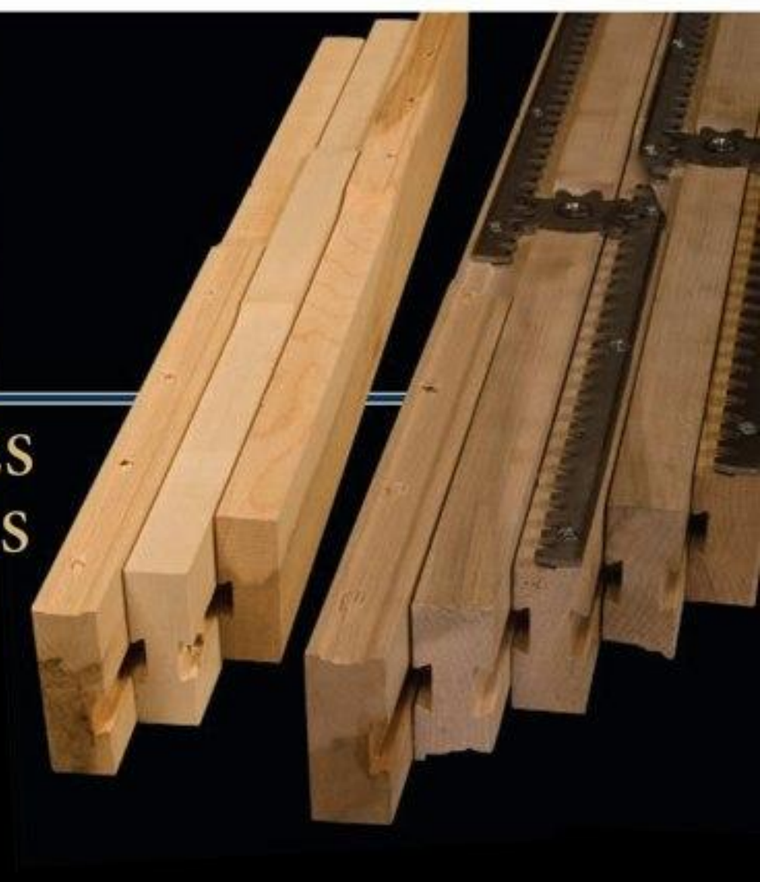
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Bandsaw Blade Organizer

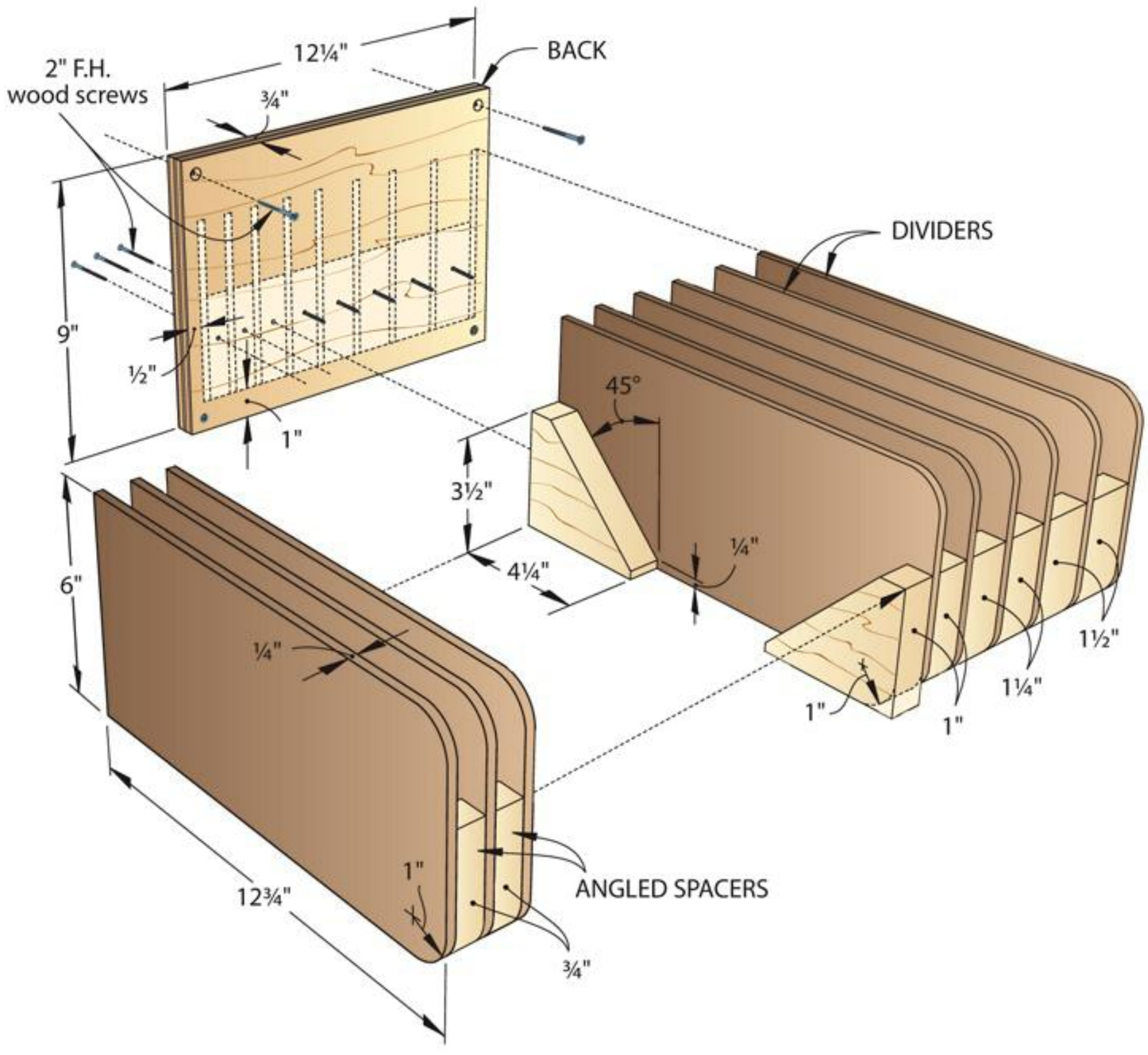
Storing blades of various widths and tooth counts for his 14" bandsaw presented a problem for Howard Lang of Wilmington, North Carolina, so he designed an organizer we knew you'd love. Use 2x4 stock for the angled spacers, ¼" hardboard for the dividers, and ¾" plywood for the back. Customize the holder to house as many blades as you normally store (we made ours to hold eight blades), sizing the angled spacers ½" thicker than the width of your blades.

Cut the spacers and dividers to shape, with a 1" radius on the corners, where shown at *right*. Glue and clamp the pieces together, keeping the edges flush. (A brad nailer speeds up the process and allows you to skip the clamping.) For long bandsaw blade, coil a blade, measure the diameter, and make the length of the dividers (front to back) 2" longer than the blade's measured diameter and the height 1" taller than the radius.

Cut the back at least ½" wider and 3" taller than the assembled blade holder. Drill mounting holes, and attach the holder to the back. Then, screw the assembled organizer to your shop wall.

Project design: **Howard E. Lang,** Wilmington, N.C.

For a FREE video on coiling a bandsaw blade, go to woodmagazine.com/coilblade



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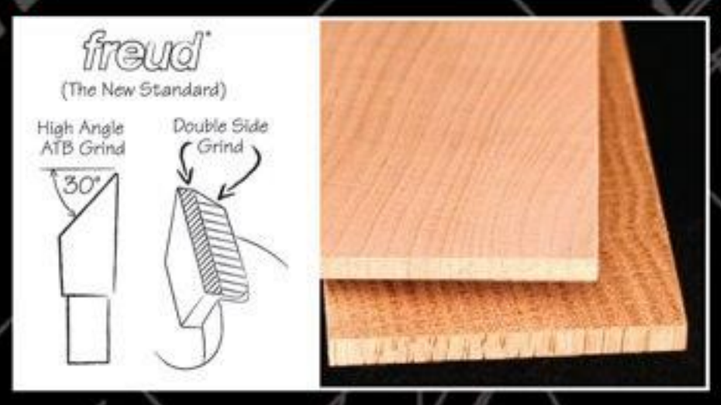
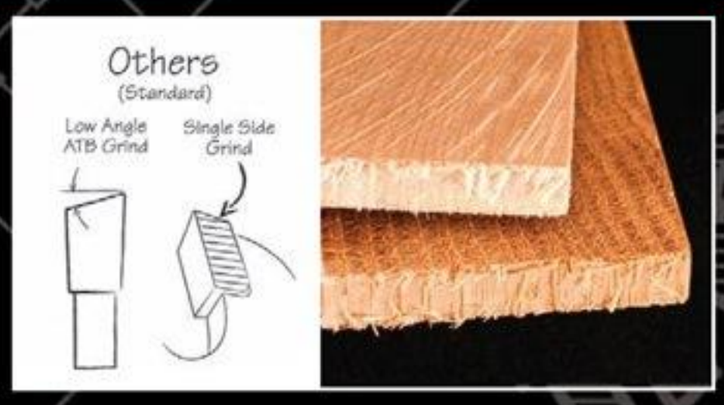
Freud's Fusion Tooth Design vs. Others





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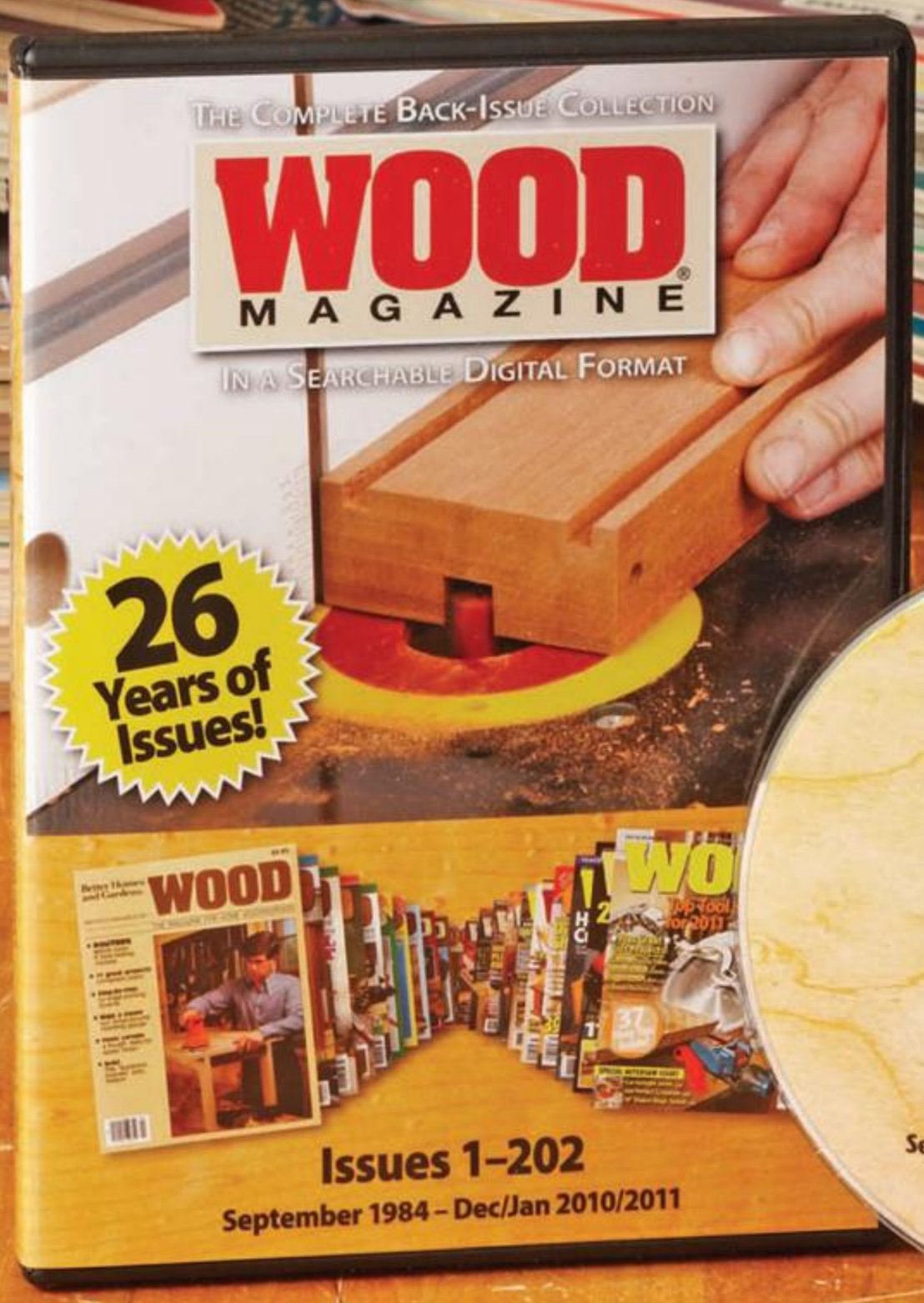

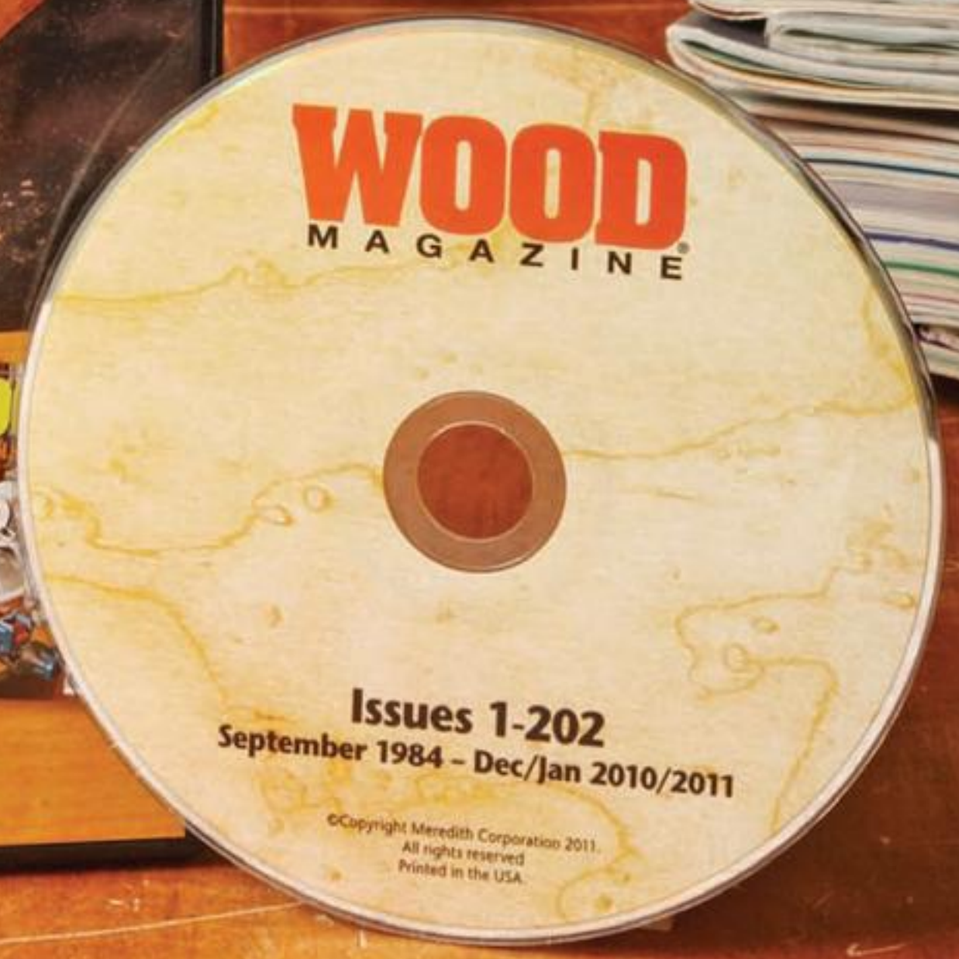

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Crisscross Clock

A simple technique for the inlay makes this clock a quicker build than you might expect.

1 Begin by cutting the body to size [**Drawing 1**] from a 1½"-thick blank of cherry (or two ¾"-thick pieces laminated together).

2 Lay out the four plug holes [**Drawing 1**] and drill the ⅝" holes ¼" deep. Cut four ⅝"-long segments from a ⅝" birch dowel, and glue them into the holes [**Photo A**]. (If you don't have a dowel, use a ⅝" plug cutter to make plugs from any light-colored wood.)

3 Using a crosscut blade on your tablesaw, cut four 3/16"-deep horizontal kerfs in the body [**Drawing 1**].

4 From ¼"-thick walnut stock, make a 3×16" blank for the inlay. After ripping test strips to get the perfect fit in the grooves, rip four strips and crosscut slightly longer than the grooves. Glue the strips into the grooves, and sand flush when dry.

5 Cut the four vertical grooves [**Drawing 1**] with the same crosscut blade. Glue inlay strips into these grooves, let dry, and sand them flush.

6 Lay out the centerpoint for the clock insert [**Drawing 1**], and bore the hole using a 3⅛" Forstner bit or an adjustable circle cutter. (If you don't own a cutter that size, see *page 20* for tips on cutting large holes by other methods.)

7 Draw the arch as shown, cut it at the bandsaw or with a jigsaw, and sand it smooth. Finish-sand all surfaces.

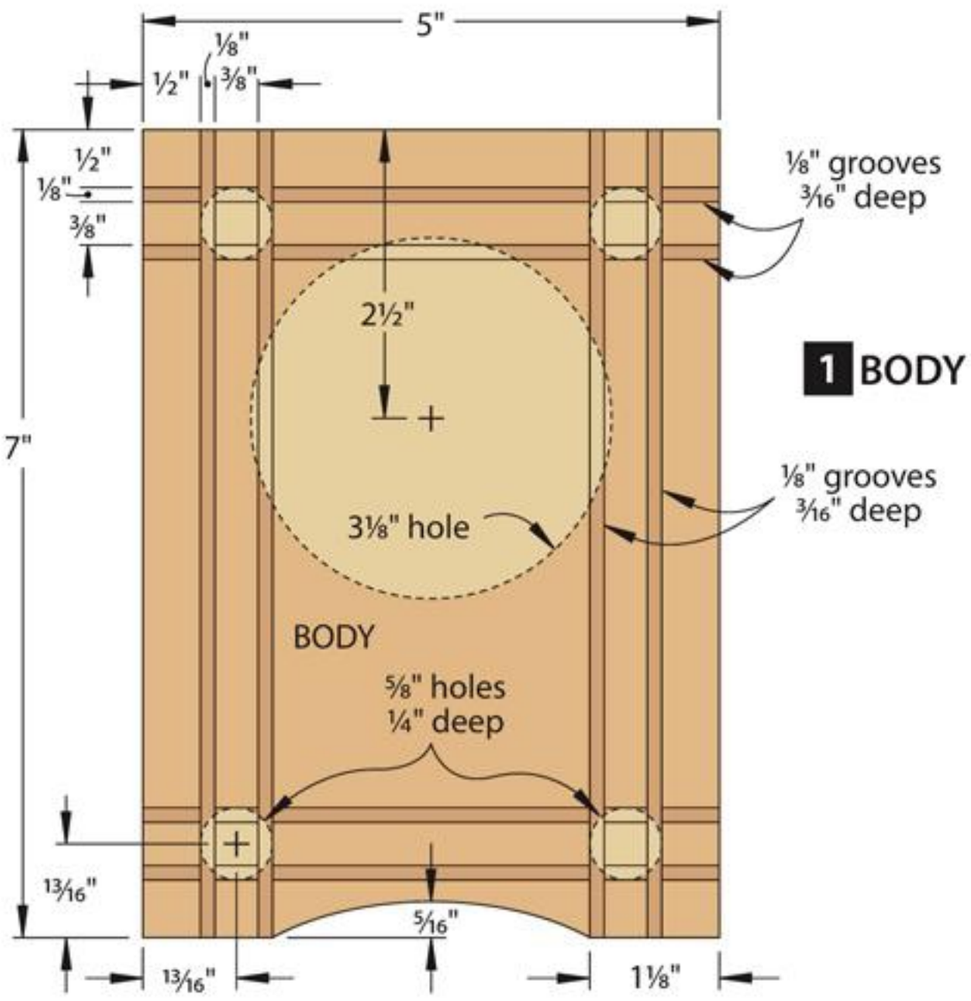
8 Cut the top to size and chamfer the four bottom edges [**Drawing 2**]. Sand the top smooth and glue the top to the body, centered in all directions.

9 Apply three coats of aerosol lacquer or polyurethane, sanding between coats with a 320-grit sponge.

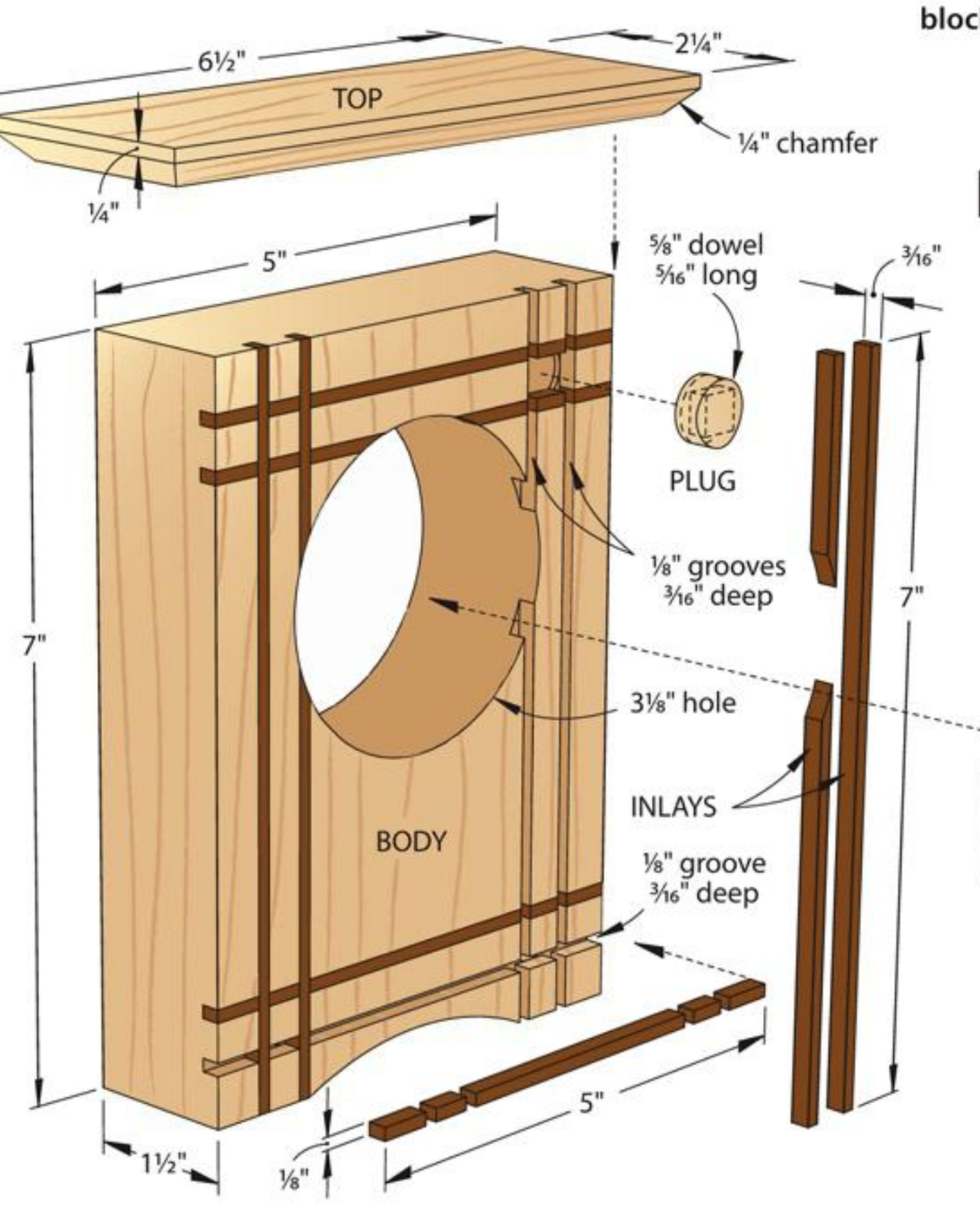
Project design: **Schlabaugh & Sons**
Illustrations: **Roxanne LeMoine**

Source

Clock movement: part #200263, $7.95 plus shipping and handling, Schlabaugh & Sons, 800-346-9663, schsons.com



1 BODY (front view)



2 EXPLODED VIEW

Orient the grain of all four plugs in the same direction. When dry, trim the plugs with a block plane and sand them flush.

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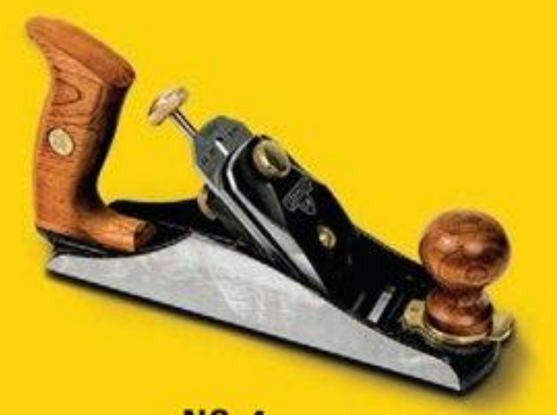
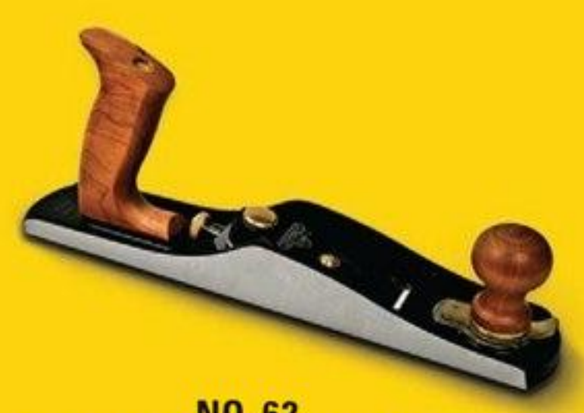
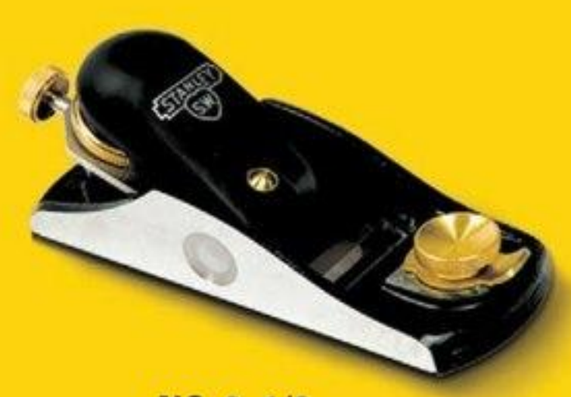
THEY'RE BACK



NO. 4
SMOOTHING PLANE



NO. 62
LOW ANGLE JACK PLANE



NO. 9 -1/2
BLOCK PLANE

NO. 60 -1/2
LOW ANGLE BLOCK PLANE

NO. 92
SHOULDER / CHISEL PLANE

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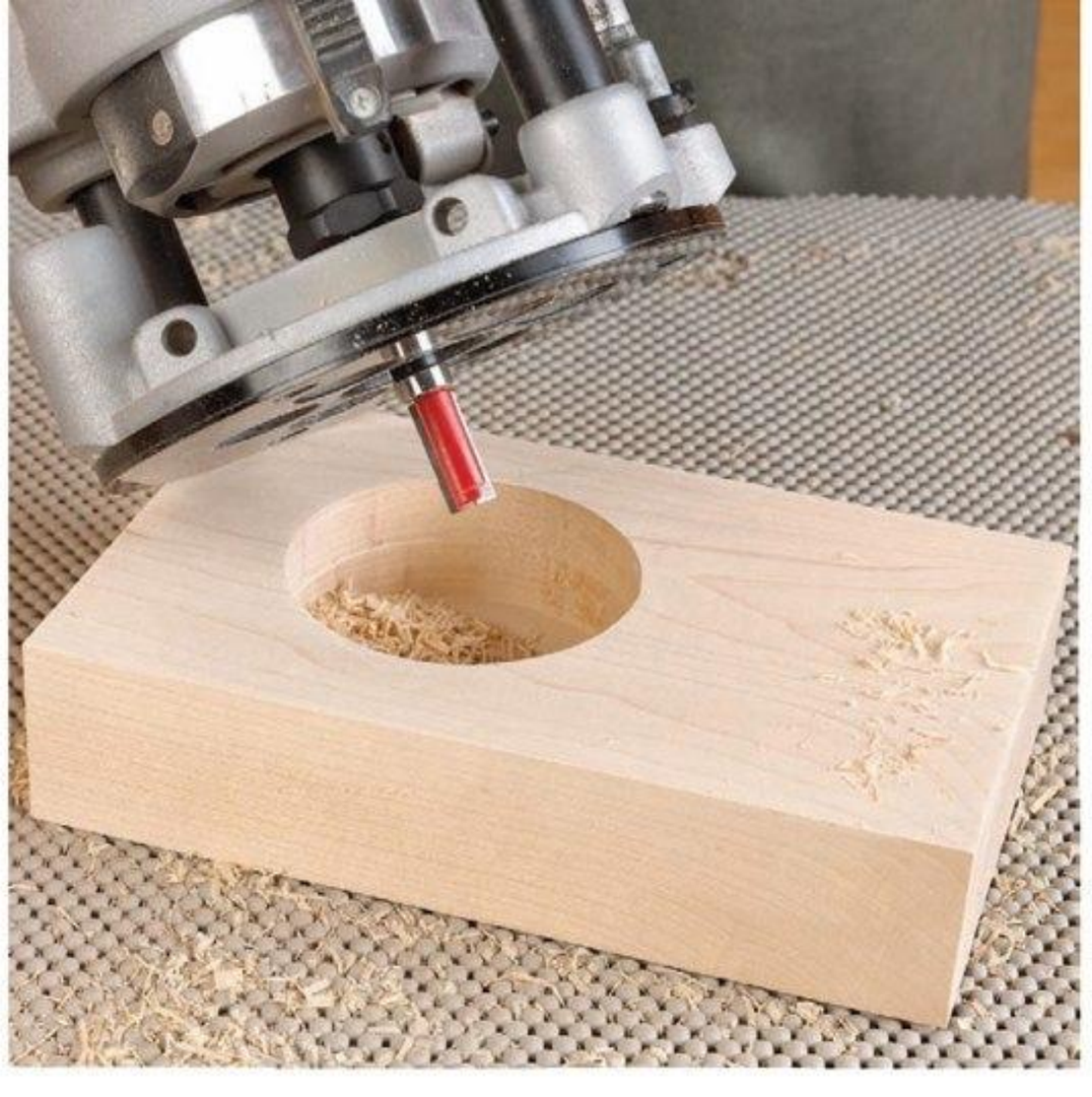
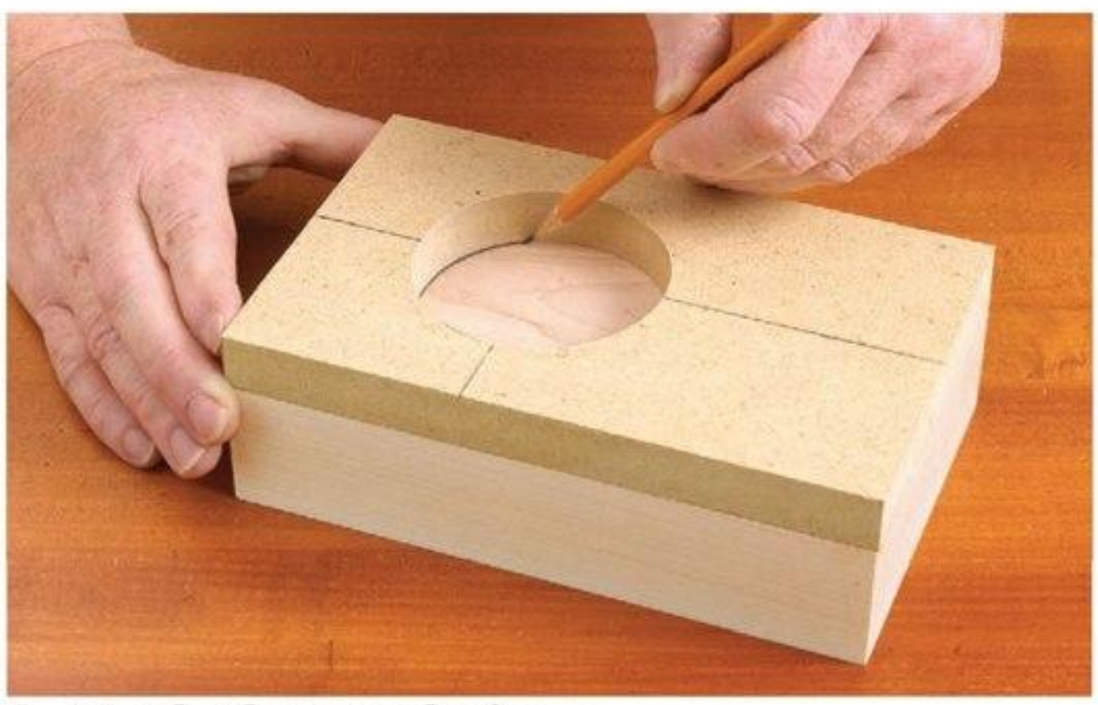
Large Holes in 5 Easy Steps

Boring big or odd-size holes just got a whole lot easier using this simple method.

Many times when making trays, shallow bowls, or clocks, the need arises to cut large holes. Often the holes are odd-size diameters or irregularly shaped. As you'll see in the steps *below*, a router, pattern bit, and shop-made template will cut these holes accurately every time.





1. Mark the workpiece

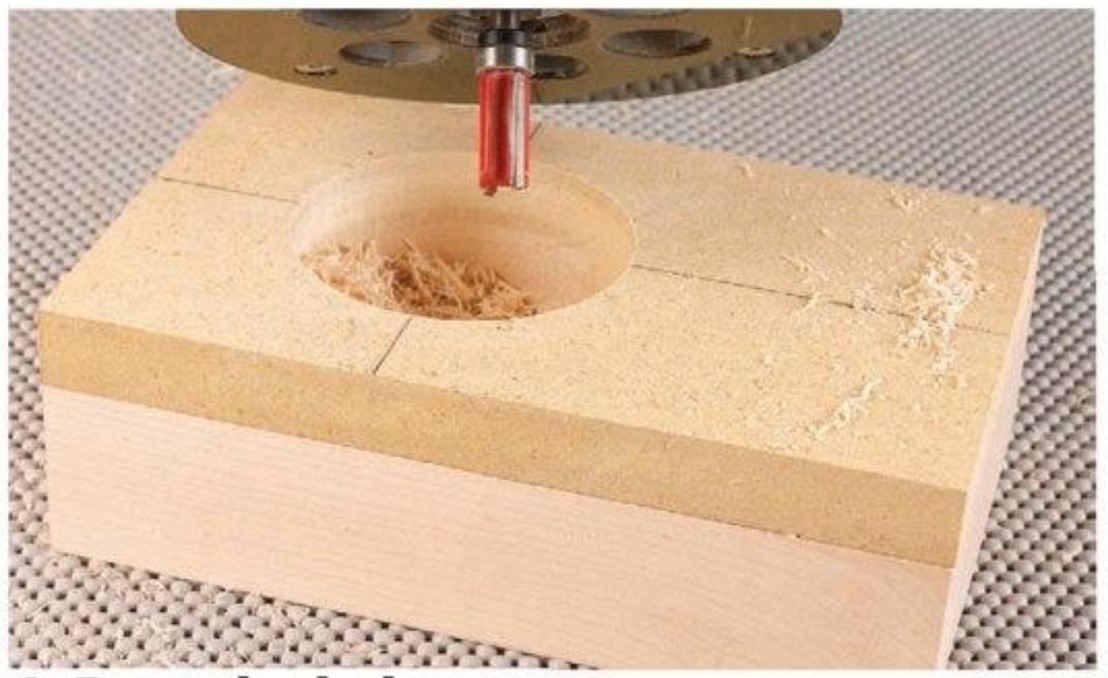
Cut an MDF or hardboard template to the desired hole shape using a jigsaw, scrollsaw, or circle cutter. Sand sawn edges smooth. Now, hold the template on the workpiece and mark the hole location as shown.

2. Rough-out the hole

Using a drill press and 1" Forstner bit set just less than the finished hole depth, hog out as much material from the hole as you can. Be sure to leave the layout line to relocate the template on the workpiece.

3. Reinstall the template

Using double-faced tape or hotmelt glue, attach the template to the workpiece. Take care aligning it with the marked layout line.



4. Rout the hole

Chuck a pattern bit in your router, set its depth so the bit's bearing contacts the template, and rout around the template's hole in a clockwise direction, smoothing the roughed-out edge of the bored hole.

5. Complete the hole

If the hole can be routed to finished depth with the template in place, reset the bit depth and complete routing the hole. If the bit won't safely reach the finished depth with the template in place, remove the template, reset the bit depth and complete the hole as shown at *top*.

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Band Clamps

Why buy?

Every workshop should have at least one band clamp—also known as a strap or web clamp—for pulling together joints on projects that prove difficult for standard bar or pipe clamps, such as frames, chairs, cases, columns, or any odd-shaped project. They all come with corner blocks for supporting angled joints, but you also can use these clamps without them. Just be aware that without corner blocks, glue squeeze-out seeps into the nylon bands and can be difficult to remove.

Bob Saunders, owner of Prairie Rose Woodworking Studio in Indianola, Iowa, tested nine band clamps and recommends these three.

LEE VALLEY, #17F10.13, $13

Expert test-drive:

This low-cost clamp works like the ratcheting tie-downs I use to secure cargo to my pickup truck. But instead of rubber-coated metal hooks on the ends of the 16'-long nylon band, it's secured to the ratchet at one end with the other end loose to pull through the ratchet before tightening. It comes with four 90° nylon corner brackets that clip onto the band and work great for square glue-ups. For odd angles, I use Lee Valley's accessory variable-angle corners (4-pack, #50K57.01, $12.95, shown in the photo) because they adjust from 30° to 180°—the only ones with this much flexibility. My advice: Buy the band clamp (#17F10.02) itself for $9.95, then get the variable corners.

To learn more:

800-871-8158, leevalley.com

CRAFTSMAN, #31458, $35

Expert test-drive:

Craftsman's easy-to-use band clamp has a one-handed ratcheting mechanism (with rubber overmolded handles) that frees up my other hand to adjust the corner blocks as I tighten it. The 16'-long nylon band pulled out easily when I depressed the release button, and automatically locked when I let go. The band's metal end hooks onto a magnetic rod that prevents the hook from coming loose while setting it up. The corner blocks adjust from 60° to 180°, but I wish Craftsman would sell extra blocks for clamping up projects with more than four corners.

To learn more:

800-383-4814, craftsman.com

BESSEY, #VAS-23, $38

Expert test-drive:

Of the seven clamps I tested similar to this one, I prefer the Bessey. Its handle closely resembles those on my Bessey K-Body parallel-jaw clamps and fits my hand perfectly. Its 23'-long nylon band was longest in the test, and although I might never need all that length, it's nice to have it available in a tight, easy-to-use reel that never gets in the way. And the metal hasp proves easy to couple and disconnect. With swiveling jaws that snugly fit 60° to 180° angles, the corner blocks have open "pockets" inside the corners to keep glue squeeze-out from getting on them.

To learn more:

800-828-1004, besseytools.com

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Blocks support sheets for circ-saw breakdown.
Little clearance needed; tools butt right alongside.

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This compact unit packs loads of lumber into only 18" of width. Casters let you swivel one end to load up sheet goods from your driveway, then swivel the other to offload sheets into your shop. The shorts rack side doubles as a simple panel saw, *right*, maximizing shop space even more. You can make it in a few hours from a single sheet of ¾" plywood, one 2×6, and seven 2×4s.

Build up the base

Start by cutting and assembling the 2×4 base with #8×3" flathead wood screws, as shown in the **Exploded View** on *page 25*. Add the 2×6 to the "sheets" side of the base keeping the bottoms of the base members flush. Cut a 16½×96" piece of ¾" plywood to serve as the top of the base. Use a jigsaw to notch the ends and attach it to the base with #8×2" flathead wood screws.

IT DOUBLES AS A CUTOFF STATION

The protruding ends act as both a clamping surface and a spacer between the spinning blade and the cutoffs stowed behind. Use a clamp-on straightedge to guide your saw.

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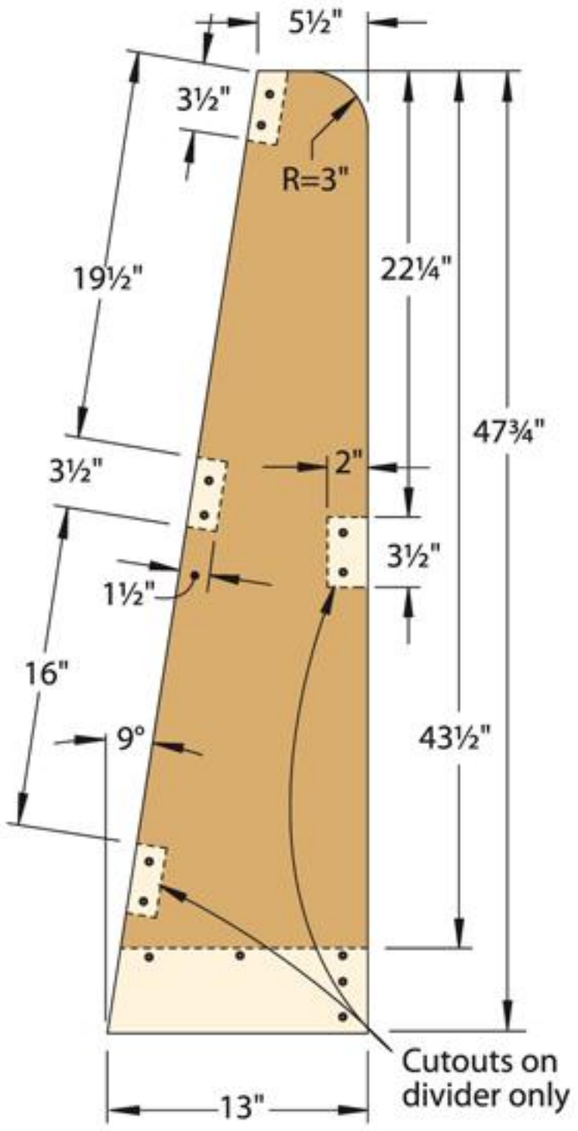
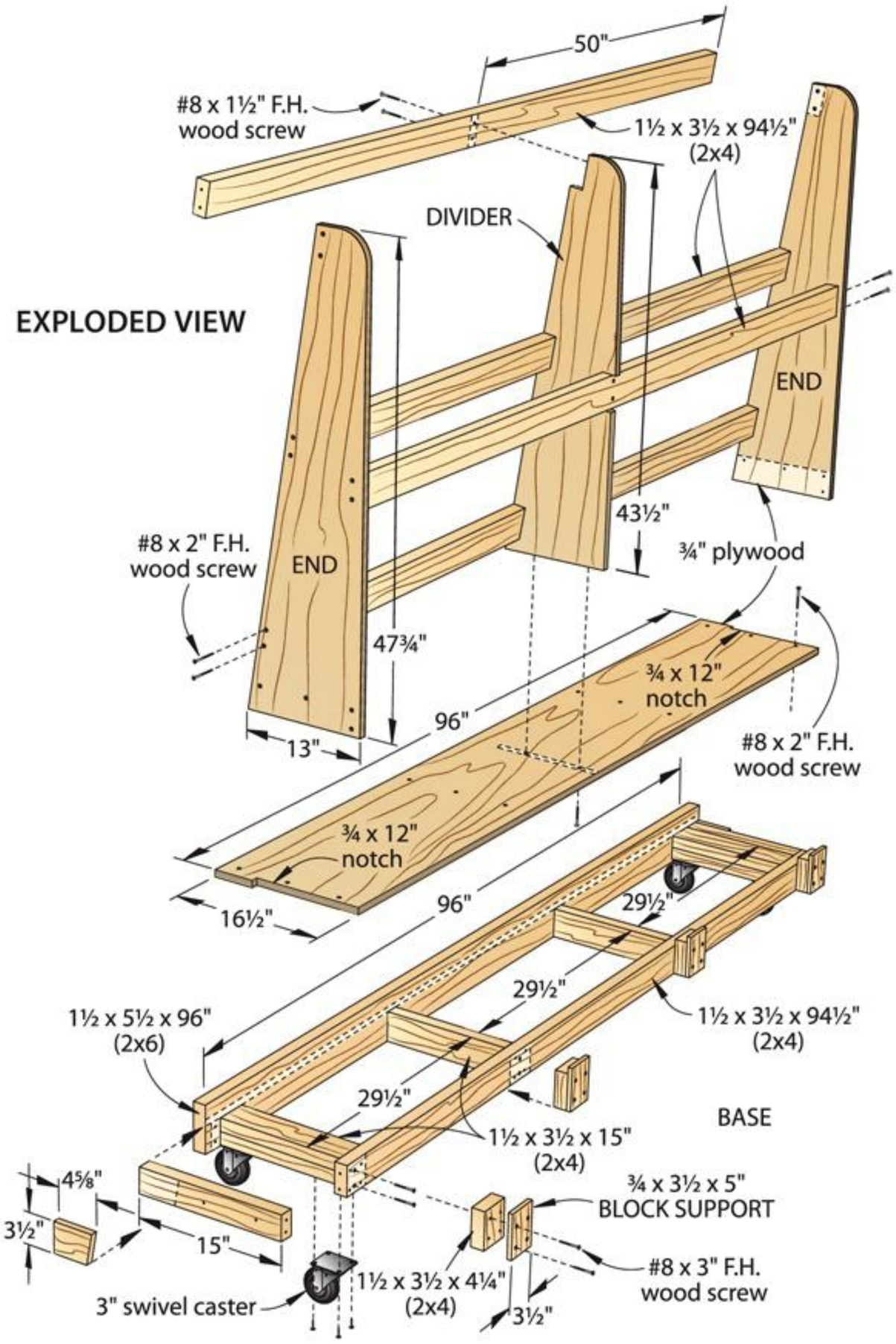




Stack up the rack

Cut the ends and divider to 13×47¾". Then, lay out and cut the angle on each, where shown in the **Ends and Divider** drawing. Set aside the angled cutoffs for later. Lay out the radius on the top of each end and the divider and jigsaw them to shape.

On the divider only, measure from the top and crosscut the divider down to 43½". Jigsaw the notches for the 2×4 supports where shown, then trace the cutout locations onto the end pieces for later reference.

With the base sitting flat on your workbench, attach the ends to the base, flush at the bottom edges and snug against the notches in the base top. (The ends protrude ½" from the front of the base to prevent sawing into the horizontal supports when used as a cutoff station. See photo on *page 24*.)

Crosscut the four horizontal supports to fit between the ends. Mark the location of the divider at 50" on each as well as on the base top. Install the horizontal supports and the divider, positioning it using the marks.

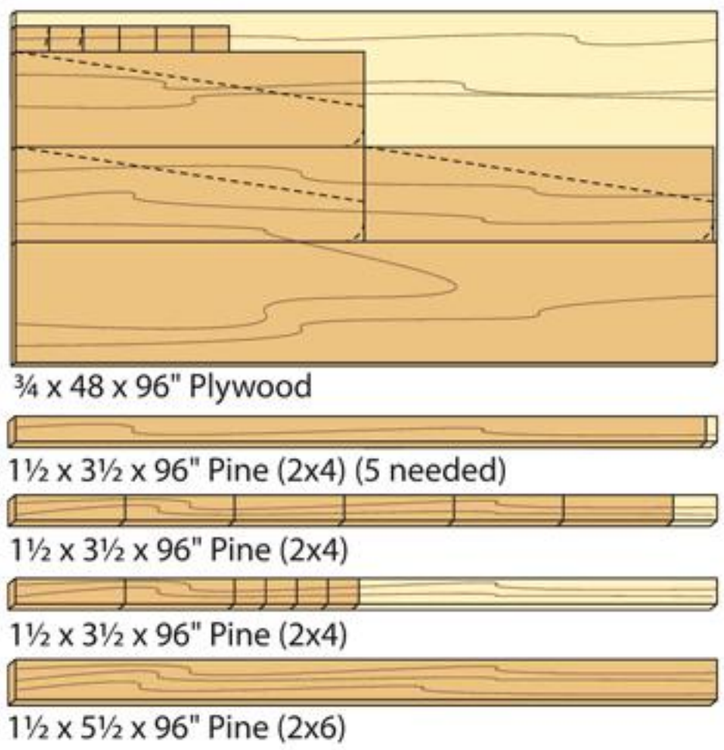
From the angled cutoffs you set aside, cut 3½×4⅝" filler pieces to fit under the protruding edge of the base top, where shown.

Install the four support blocks on the "shorts" side to serve as supports for breaking down sheet goods. Now load 'er up, tuck 'er away in the corner, and enjoy the extra space you've created.

Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

For enlargeable versions of these drawings go to
woodmagazine.com/cutoffstation

Cutting Diagram



Bandsaw Solutions:

Find the ✔ Right Blade, ✔ Right Tension, ✔ Right Results

Match your bandsaw blade to the job, then set up the saw for accurate cuts, time after time.

Bandsaw blades are like drill-press speeds: We know we should change them for different tasks, but we usually don't. However a little extra effort to change those blades will reward you with better cuts and longer-lasting equipment. Here's how to best match the blade to the job at hand.

Blade basics

As you shop for blades, it helps to know some of the essential terms (see *below*):

- ***Gullet:*** a chip-clearing gap between the teeth.
- ***Pitch:*** the spacing of teeth, expressed in teeth-per-inch (TPI).
- ***Rake angle:*** the angle of the tooth face relative to the blade body.
- ***Set:*** the pattern of bending teeth to the left or right to create a kerf wide enough to keep wood from pinching the blade body as you cut.

Next match the blade pitch to the workpiece thickness. The thinner the stock, the greater the TPI you can use. You want at least three teeth in the wood at any one time as the blade cuts, but no more than 12, *top right*. (To resaw pieces more than 6" wide, just slow the feed rate.) More teeth leave smoother surfaces, but have smaller gullets that inhibit chip clearing.

ENOUGH TEETH TO CHEW WOOD

With 11 saw teeth in the wood as the blade cuts, this blade pushes the limits of its chip-clearing ability.

Match the blade to the task

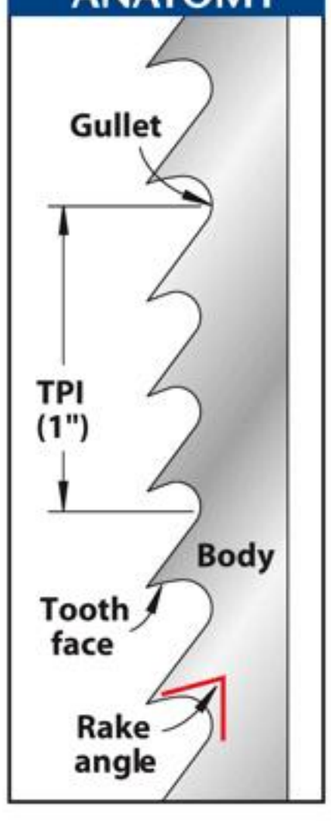
For this job…	…use this blade
Fine cuts and tight curves in stock thinner than ½"	⅛" – 3⁄16", 10 – 14 tpi, standard tooth
Scrollwork in stock about ¾" thick	¼", 4 – 6 tpi, standard tooth
General-purpose work, curves >⅝"	¼", 6 tpi, skip tooth
Smooth, straight crosscuts and rips	½", 14 tpi, standard tooth
Resawing maximum-width hardwoods or green wood	½" – ¾"*, 3 tpi, hook or skip tooth

* Saw size may limit maximum blade width.

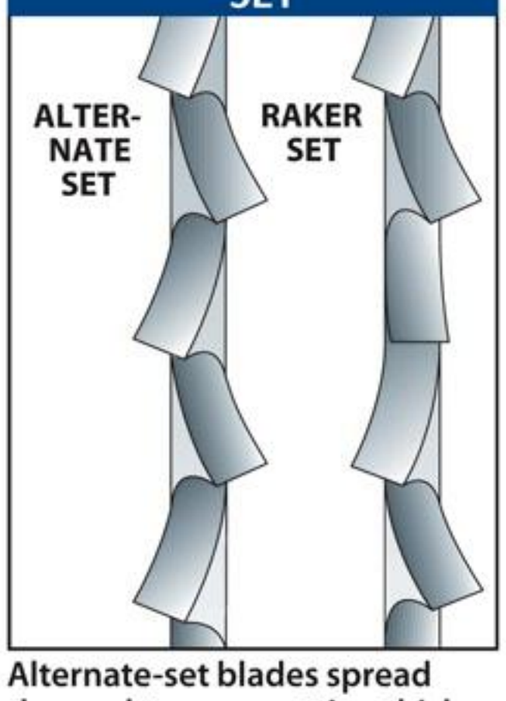
For general rules on the best TPI for everyday jobs, see the chart *above*. To match a blade to curved cuts, refer to the chart *below*. For resawing, install the widest blade that fits your saw as specified in the manual.

BANDSAW BLADE BASICS:

ANATOMY

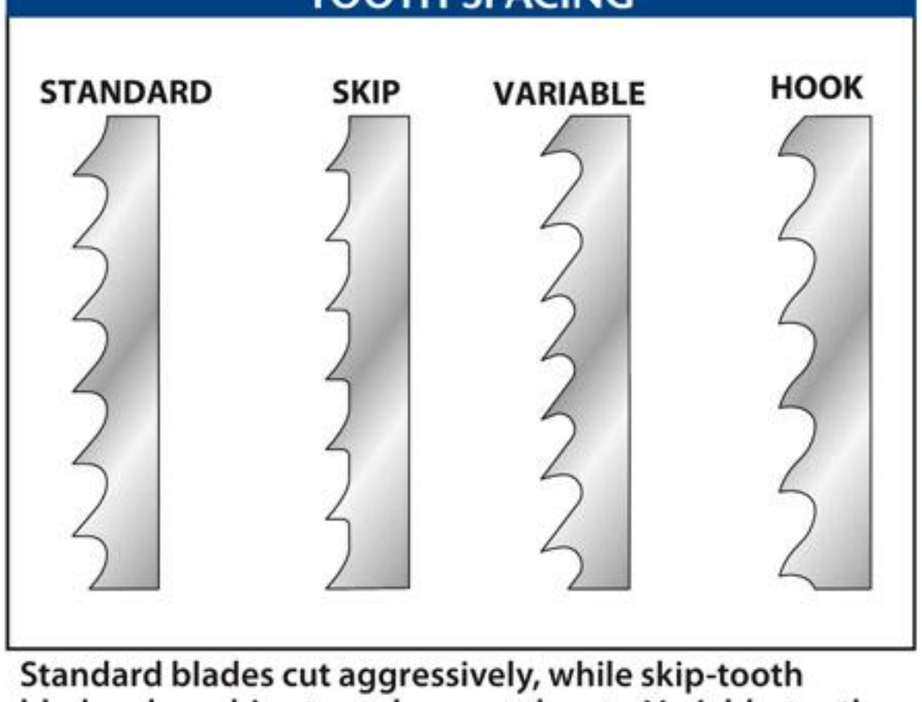


SET



Alternate-set blades spread the work to ease cutting thick stock. Raker teeth cut cleaner by clearing chips better.

TOOTH SPACING



Standard blades cut aggressively, while skip-tooth blades clear chips to make smooth cuts. Variable-tooth spacing compromises on both. Hook teeth prove most aggressive, but dull faster.

CHOOSING WIDTH

Tightest Radius	Blade Width
3⁄16"	⅛"
5⁄16"	3⁄16"
⅝"	¼"
1½"	⅜"
2½"	½"
4"	⅝"
5½"	¾"
7"	1"

Find the tightest curve to be cut, then choose a blade no wider than shown to the right of that radius.

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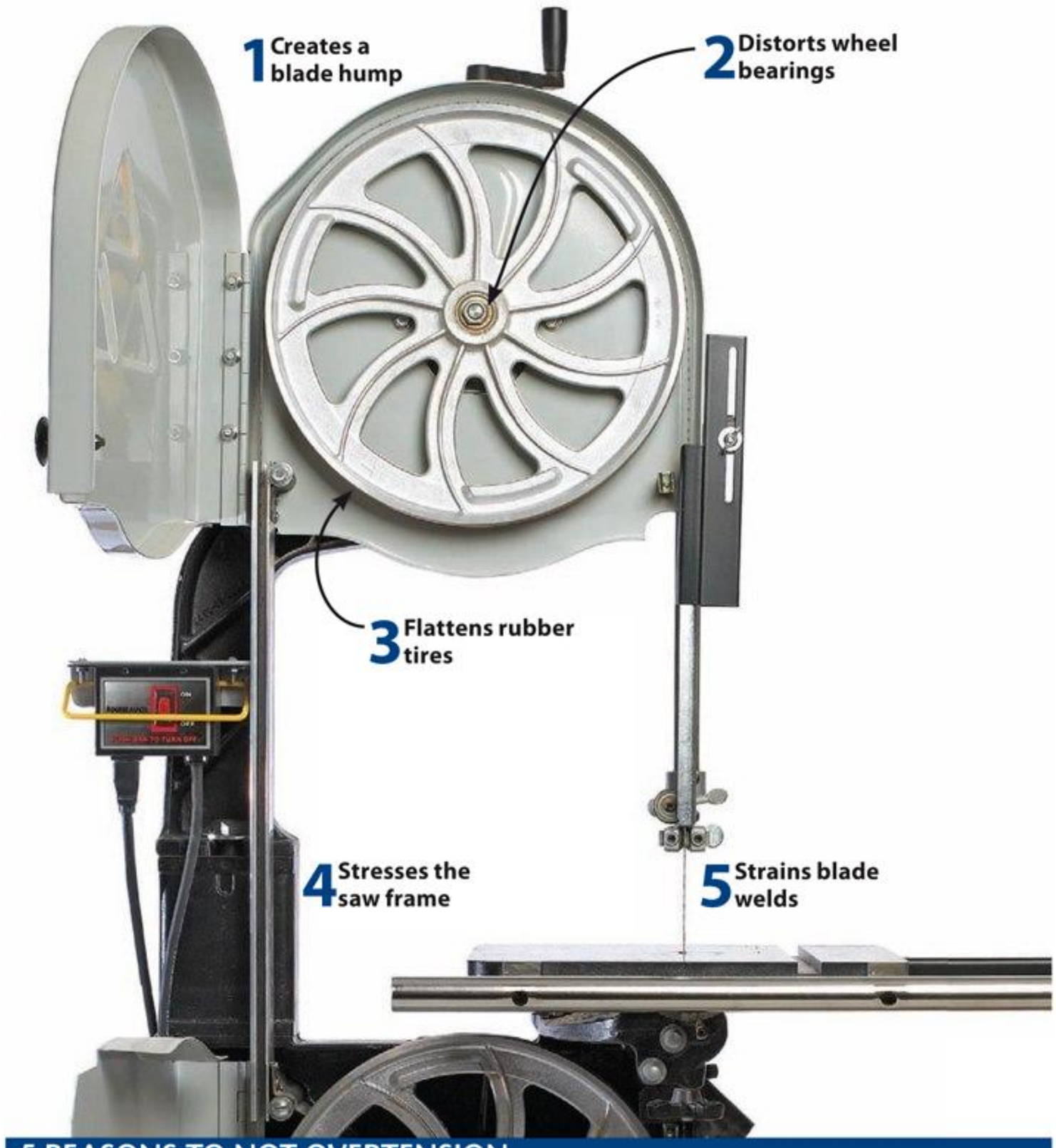


5 REASONS TO NOT OVERTENSION

Constant tension on an idle bandsaw blade creates stresses that lead to premature wear, vibration, and broken blades. Detension if the saw will sit unused for more than a day.

Turn up the tension

With too little tension, bandsaw blades will stall in the wood or drift off the cut line. But too much tension stresses the saw, as shown *above*, and shortens blade life. You can buy expensive (though accurate) tensioning gauges, but tensioning needn't be that precise. Instead, set the tension one of these three ways:

■ ***The built-in tensioning scale.*** These typically indicate more than the actual tension, but they're sufficient for most jobs. If you notice blade deflection, try one of the following methods.

■ ***The deflection test.*** First set the blade tension using the built-in gauge and raise the upper guide as high as it will go. Then stand a square ⅛" from the blade, and push the center of the blade with your thumb, as shown *above*. Under moderate pressure, the blade should just touch the square.

■ ***The "flutter" test.*** With the guide blocks or bearings withdrawn from the blade, tension the blade using the built-in gauge. Turn on the saw and release tension a half-turn at a time until the blade visibly flutters. Now increase the tension until the fluttering just stops; then add a quarter- to a half-turn of the tensioning knob.

TENSION LIMITS DEFLECTION

If moderate thumb pressure presses the blade against a square placed ⅛" away, increase tension one full turn and retest.

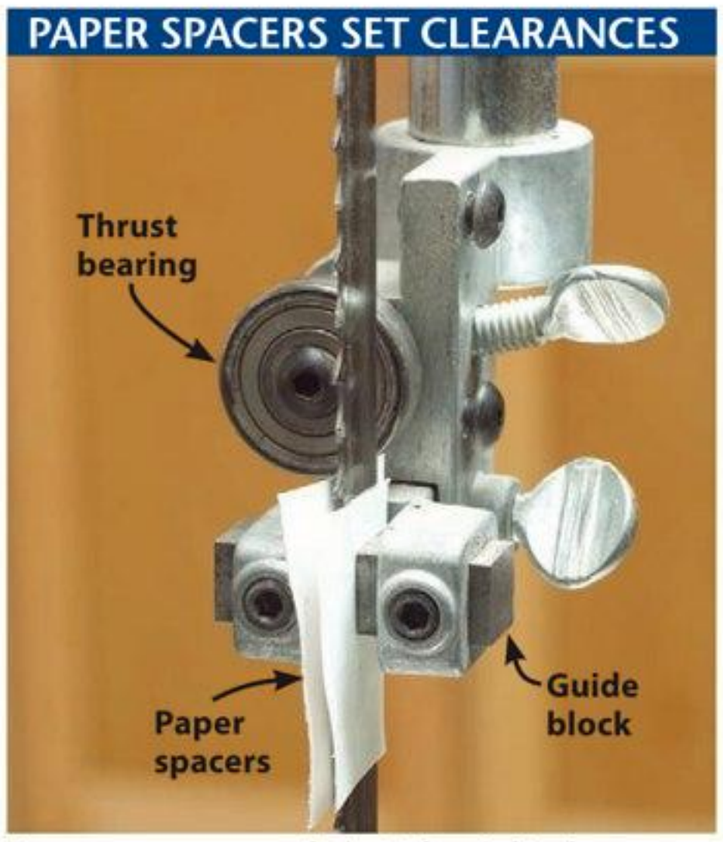
Now set the guides

With the blade tensioned and the saw unplugged, loosen the upper and lower pairs of guide blocks and back off both thrust bearings. (Spin the blade wheels by hand to center the blade if you've changed blades.)

Place paper spacers between the loosened upper guide blocks or bearings, and press the blocks and spacers against the blade body, *right*. Tighten the guides in place while pressing them against the blade, and repeat for the lower guides. Now advance the upper thrust bearing until the blade just clears it, *far right*. Tighten the thrust bearing in position, repeat for the lower thrust bearing, and you're ready to cut.

Written by **Bob Wilson**

PAPER SPACERS SET CLEARANCES



Paper spacers supply just the right clearance between guide blocks or bearings and the body of the blade.

THRUST BEARING REMAINS IDLE

As the blade spins, the blade should just clear the thrust bearing.

Watch a bandsaw tensioning video at woodmagazine.com/bladetension

Easy, breezy Glider

Dimensions: 58"W x 27¼"D x 42"H

PROJECT HIGHLIGHTS

- Approximate materials cost: $130 for cedar, $28 for glider hardware (see **Source**), and $42 for nuts, bolts, washers, and screws.
- Suitable for use on the porch, deck, or lawn.

Sit back, relax, and enjoy summer evenings with a friend in this comfy glider. To build it, you need only "one-by" and "two-by" cedar boards, screws, and the simple swinging hardware sourced on *page 34*.

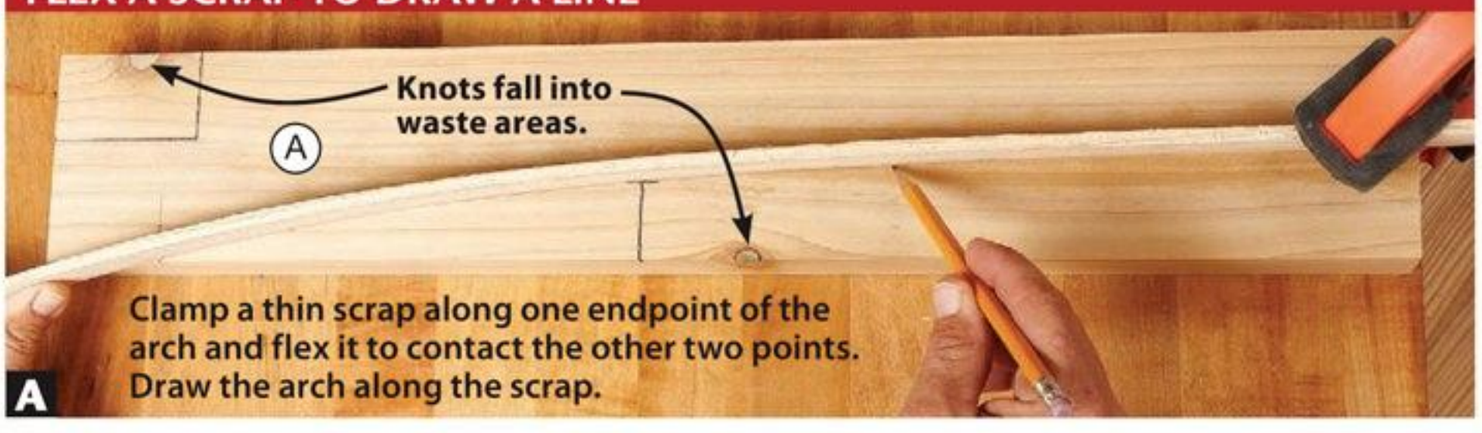
Build two side frames for the seat

1 On the clearest areas of 1½"-thick dimensional cedar, lay out parts A–K ½" longer than listed [**Materials List**, *page 34*; **Shop Tip**, *opposite page*]. Crosscut and rip the pieces to rough lengths and finished widths. Set aside all parts but the legs (A) for now.

2 Crosscut the legs (A) to length, then lay out the notch to receive the arm rail (C) [**Drawing 1**]. On one leg only, lay out the three points that define the curve and draw the curve [**Photo A**].

3 Set your tablesaw blade 1½" above the table and position the rip fence 2½" from the *outside* of the blade. Make repeated passes to cut the notch in each leg (A) [**Photo B**]. Bandsaw or jigsaw the

FLEX A SCRAP TO DRAW A LINE


Knots fall into waste areas.
A
Clamp a thin scrap along one endpoint of the arch and flex it to contact the other two points. Draw the arch along the scrap.
A

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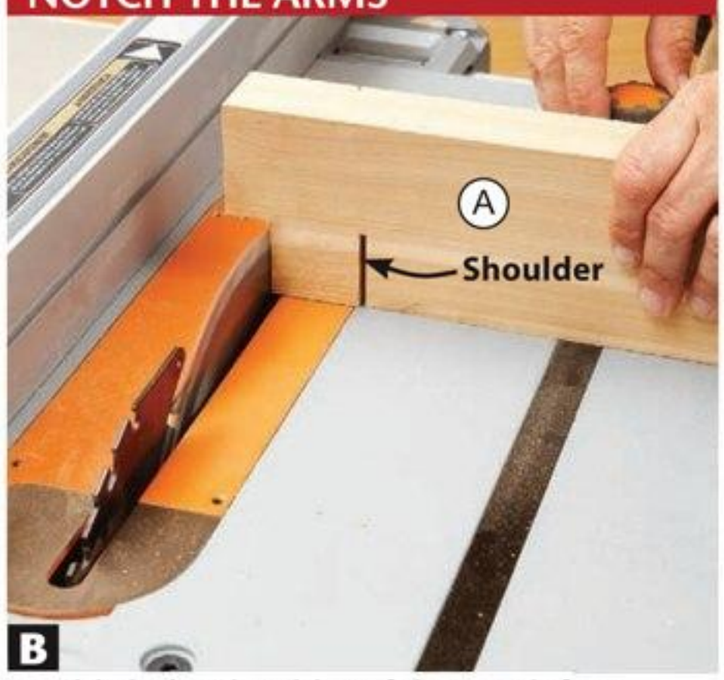
NOTCH THE ARMS



Establish the shoulder of the notch first, then remove the remaining material with repeated passes over the blade.

SECURE THE ARM RAILS

Overhang the arm rail (C) 2" past the front face of the front leg (A). Make two mirrored leg/rail assemblies (A–C).

LAY OUT A FLOWING CURVE

Flex a thin scrap between the rearmost three points, then use the front point and the corner of the blank to form the front curve.

curve in one leg and sand it smooth. Using this leg as a template, transfer the curve to the other legs. Cut the curves, then stack and clamp all four legs together to sand them to final shape. Start with 100-grit sandpaper and end with 150 grit.

4 Crosscut the lower rails (B) to finished length [**Drawing 2**]. Set your tablesaw miter gauge to 15° and miter-cut the arm rails (C) to finished length.

Quick Tip! Save time and improve accuracy. Leave your miter gauge set at 15° for cutting several more pieces in the next few steps. Lay out and cut the curve at the front end of each arm rail. Screw each lower rail between two legs (A), then glue and screw the arm rails in place [**Photo C**].

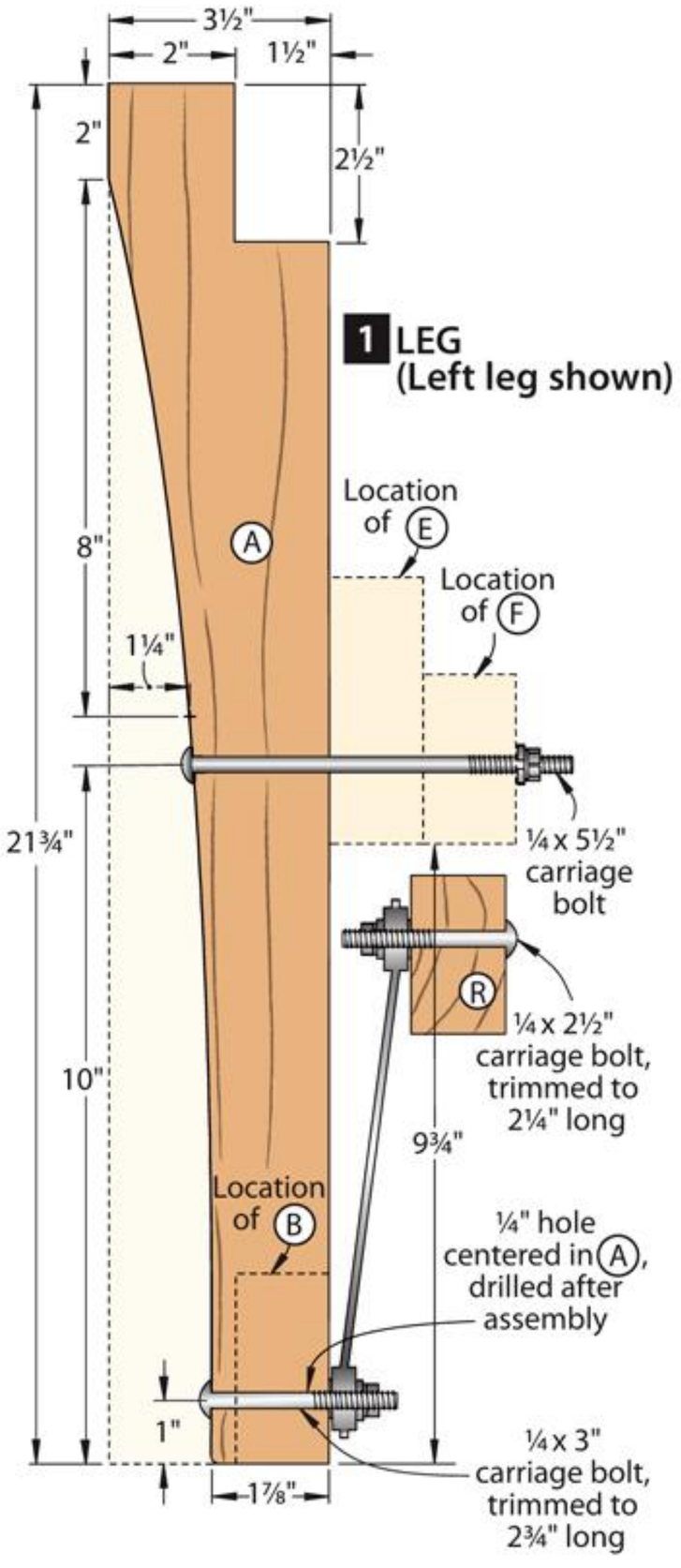
Note: *For the screw joints on this project, drill 3/32" countersunk pilot holes before driving the screws. Also use a glue suitable for outdoor applications: type II or III yellow (PVA) or a polyurethane glue.*

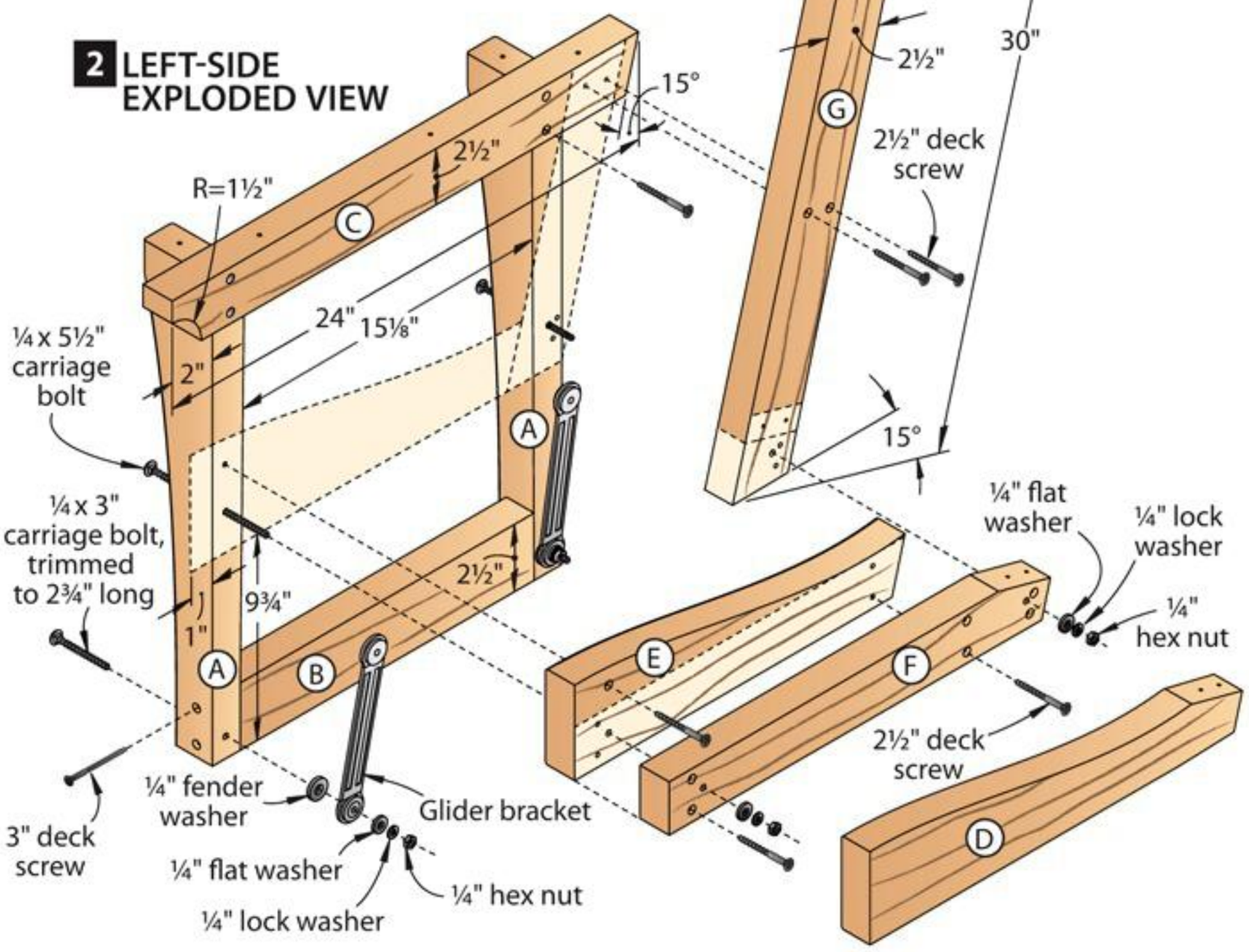
5 Retrieve the center seat rail (D). Lay out the 15° angle at the back, and the curve on the top edge [**Drawing 3, Photo D**]. At the tablesaw, miter-cut the end of the rail, then cut the top edge with a jigsaw or bandsaw, and sand the top edge to 150 grit.

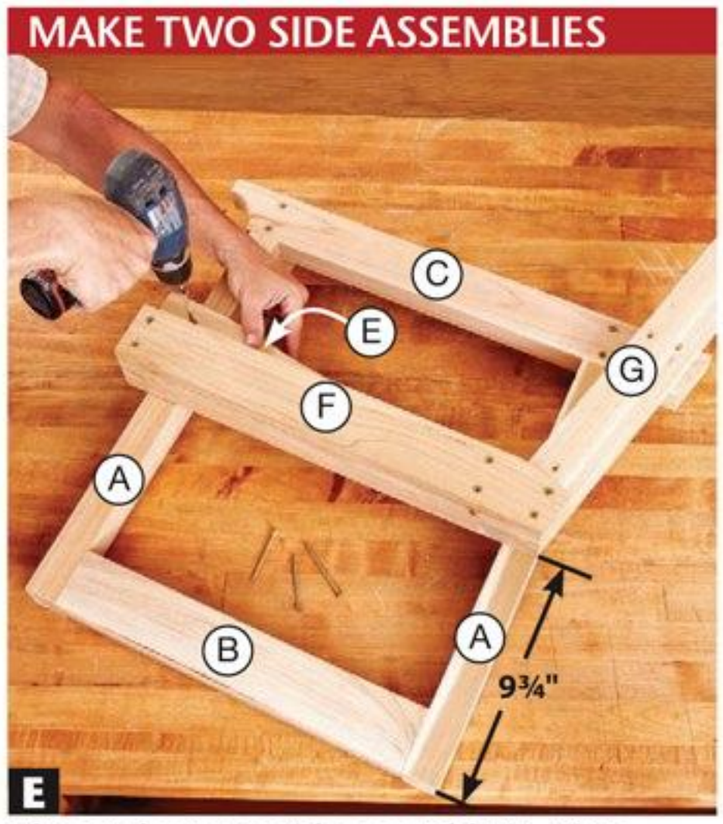
SHOP TIP

Create clear stock, even when it's knot

Careful layout of parts minimizes knots that can weaken your project or detract from its appearance. In **Photo A**, the knots fall into waste areas of the leg (A) blank, yielding a clear workpiece.

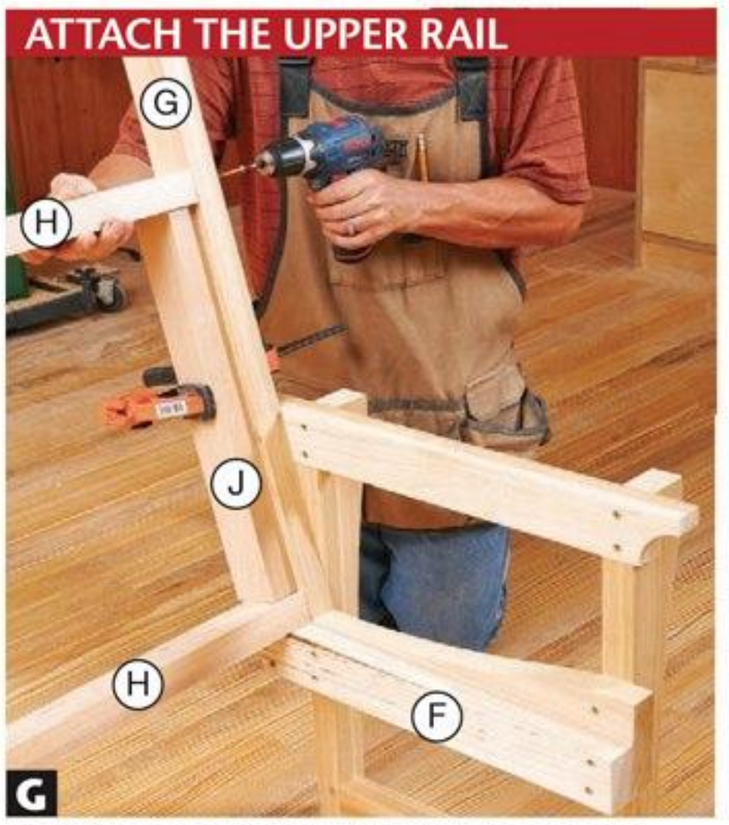






Glue and screw a side assembly (E–G) to a leg assembly (A–C). Make two mirrored assemblies.

With a squaring brace clamped to the pieces, drive a 2½" deck screw through the back rail (H) into the end-rail brace (F).



Position a lower splat filler (J) at each end between the back rails (H), then drive 3" deck screws to secure the upper back rail.

6 Use the center seat rail (D) as a template to lay out the curved shape of the end seat rails (E) and the angled end of the end-rail braces (F) [**Drawing 3**]. Miter-cut the ends of these pieces. Then cut the curves in the end seat rails and sand them to shape. Finish-sand the seat rails and end-rail braces.

7 With the miter gauge still at 15°, miter-cut the uprights (G) to length [**Drawing 2**]. Glue and screw an end seat rail (E) to an end-rail brace (F), flush at the front and bottom. Glue and screw an upright to this assembly with its end flush to the bottom edges of the rail and brace. Repeat this process to create a mirrored assembly (E–G) for the opposite side of the glider. Screw and glue each side assembly to a leg assembly (A–C) [**Photo E**].

Add a place to sit

1 Cut the back rails (H) and front rail (I) to size [**Drawing 4**]. Join the side assemblies (A–G) by screwing a back rail to each end-rail brace (F), flush at the back [**Photo F**]. Cut the lower splat fillers (J) to finished length [**Drawing 5**] and use them as spacers to position the upper back rail [**Photo G**].

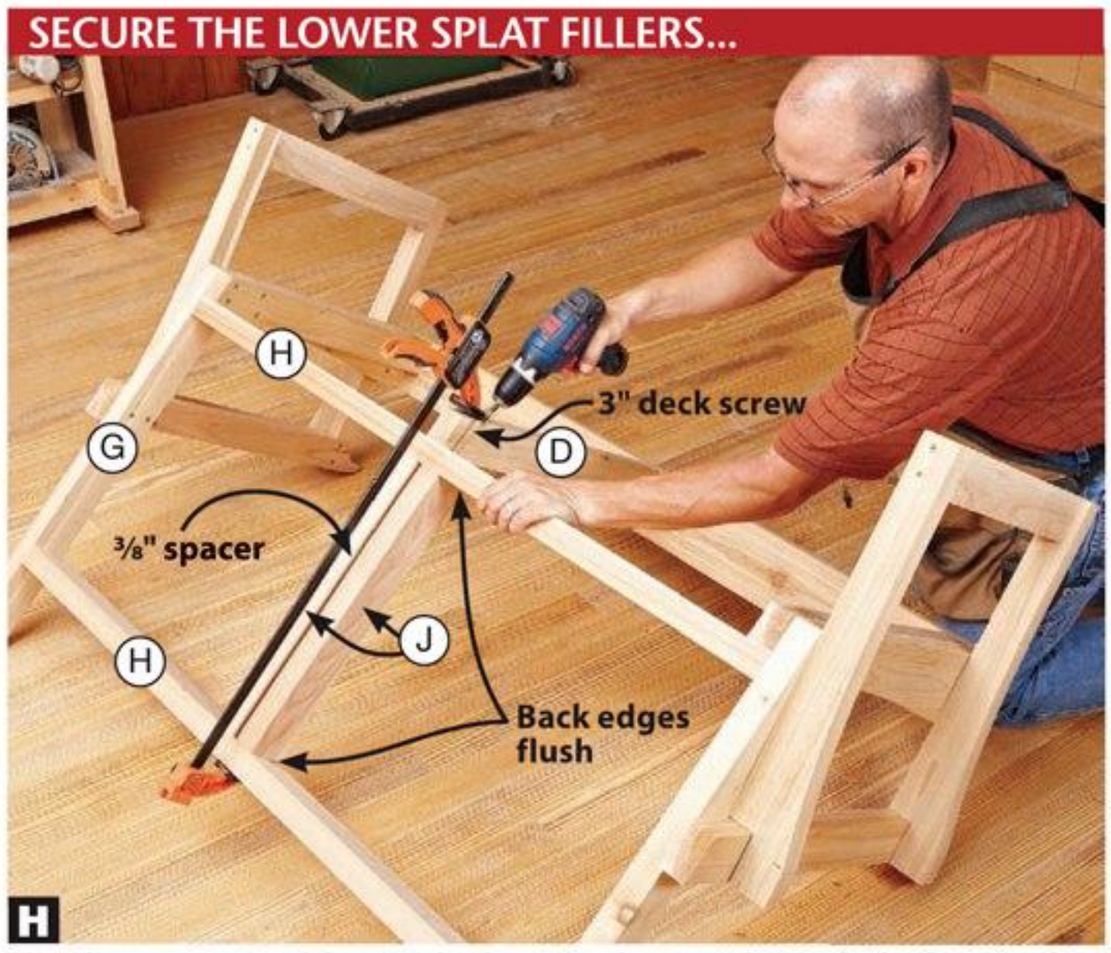
2 Rout ⅛" round-overs on the front bottom edge and ends of the front rail (I) [**Drawing 4**], then screw it to the ends of the end seat rails (E). Screw the center seat rail (D) between the front and back (H) rails, centered on their lengths, and flush with their top edges.

3 Place a ⅜"-thick scrap between the lower splat fillers (J) and center this assembly on the length of the back rails (H) [**Photo H**]. Screw through both back rails into the splat fillers and then remove the scrap.

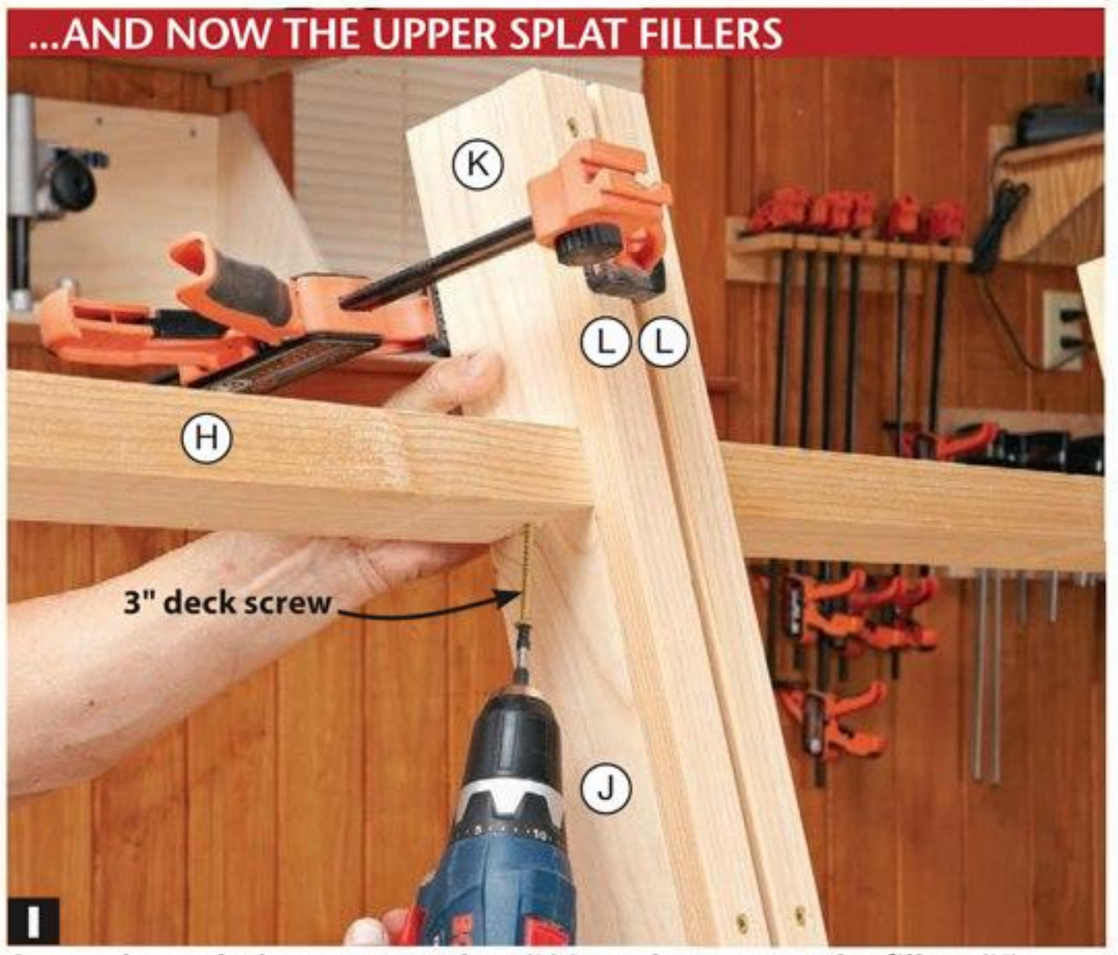
4 To determine the length of the upper splat fillers (K), measure from the top face of the upper back rail (H) to the top of an upright (G). Cut the upper splat fillers to this length, then set them aside. From ¾"-thick stock, rip and crosscut the narrow splats (L) to size, with a 15° bevel on one end [**Drawing 5**]. Rout ⅛" round-overs on the front faces, except for the bottom ends. Glue and screw a narrow splat to the front edge of each upright (G) and lower splat filler (J). Retrieve the upper splat fillers and glue and screw them in place [**Photo I**].

Back it up

1 Cut the splats (M) to size [**Materials List**] and cut fourteen ⅜"-thick spac-



Flip the seat assembly upside down and screw through the back rails (H) into the lower splat fillers (J).



Screw through the narrow splats (L) into the upper splat fillers (K), then toe-screw through the upper back rail (H) into the fillers.

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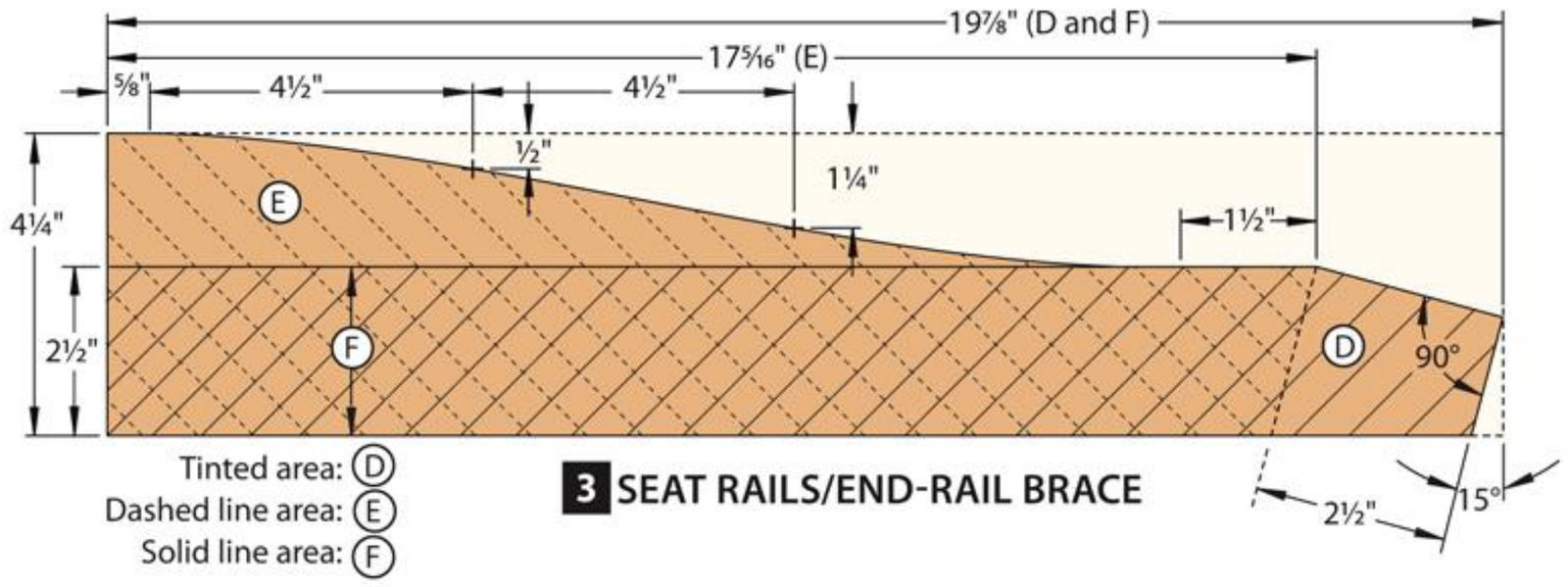
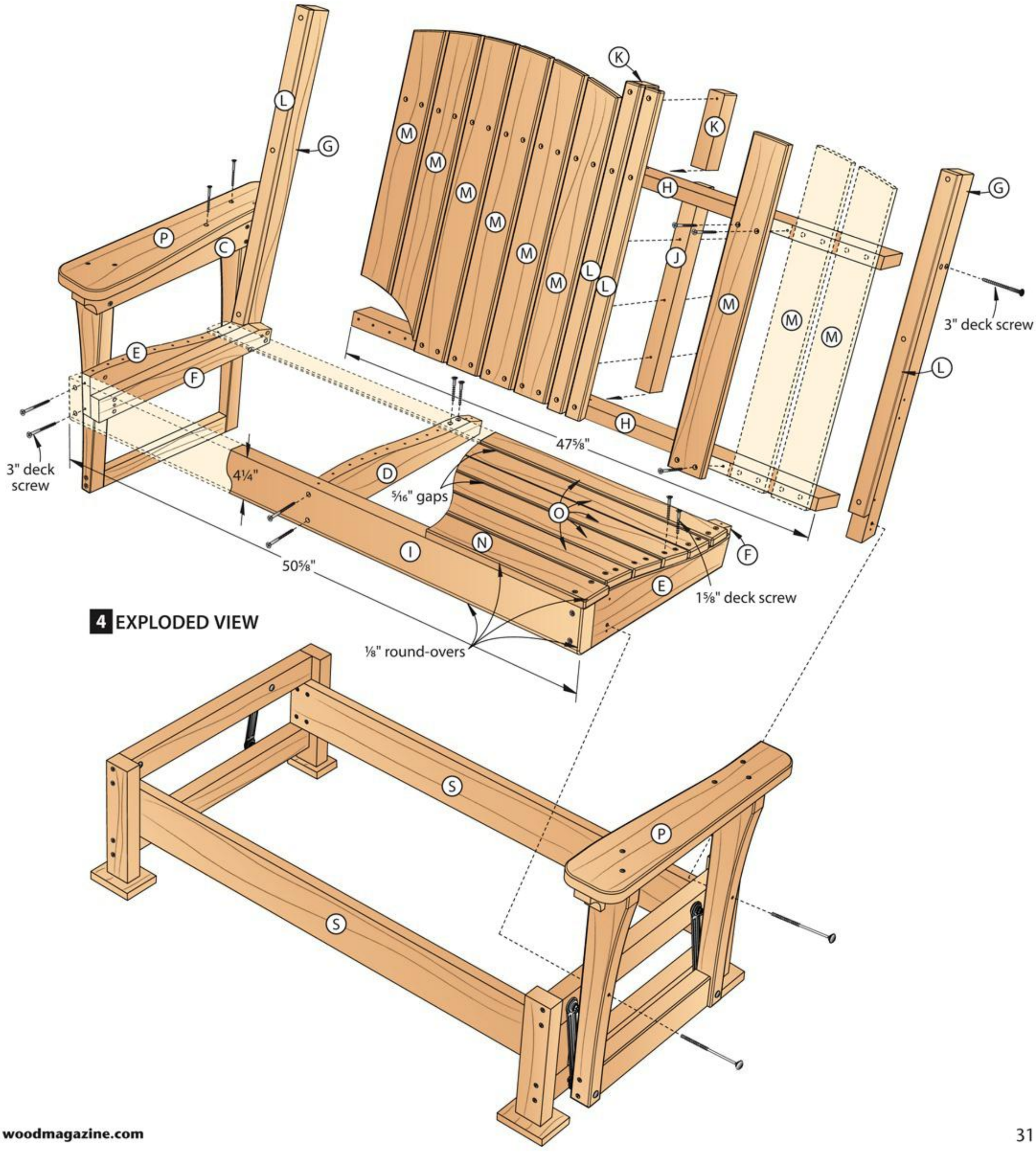
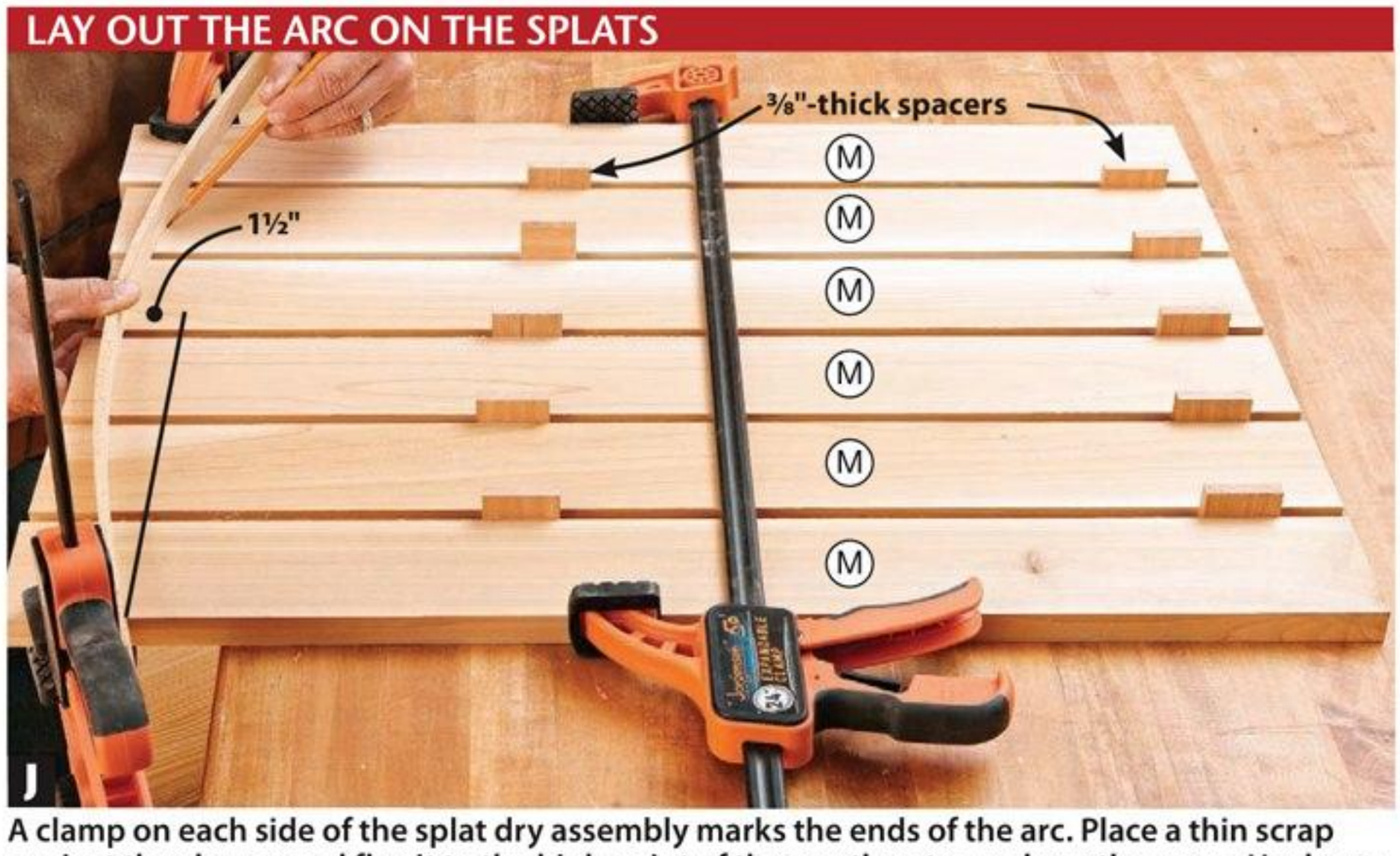


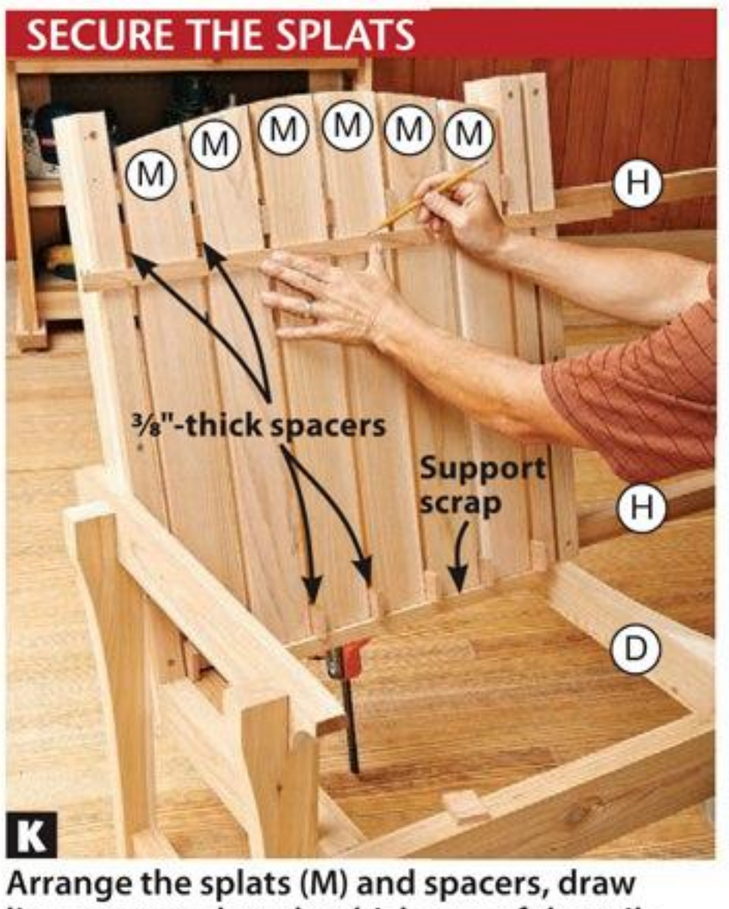
3 SEAT RAILS/END-RAIL BRACE



4 EXPLODED VIEW



A clamp on each side of the splat dry assembly marks the ends of the arc. Place a thin scrap against the clamps and flex it to the high point of the arc; then trace along the scrap. Unclamp the assembly and cut each splat individually.

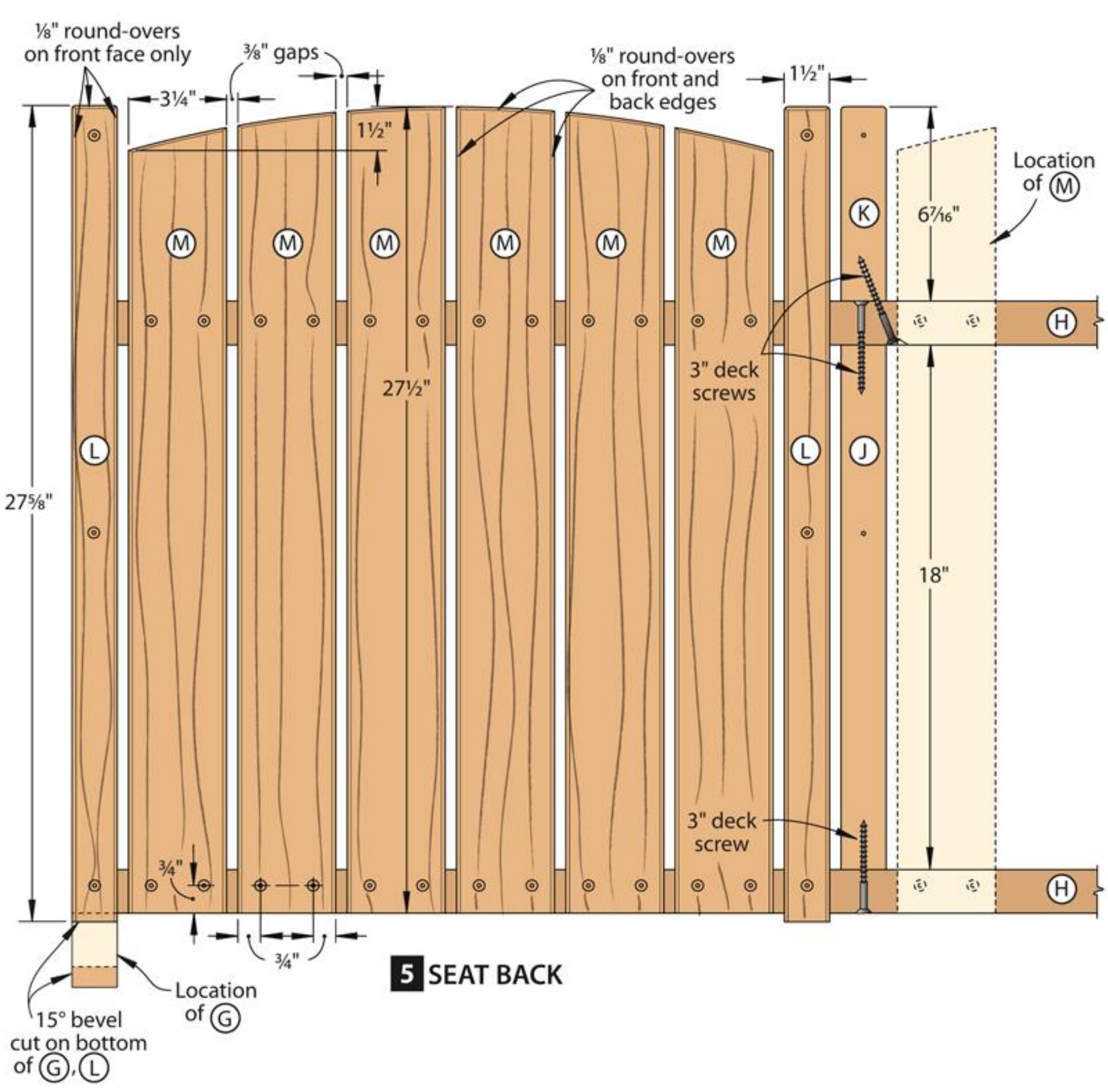


Arrange the splats (M) and spacers, draw lines centered on the thickness of the rails (H), and drive screws along the lines.

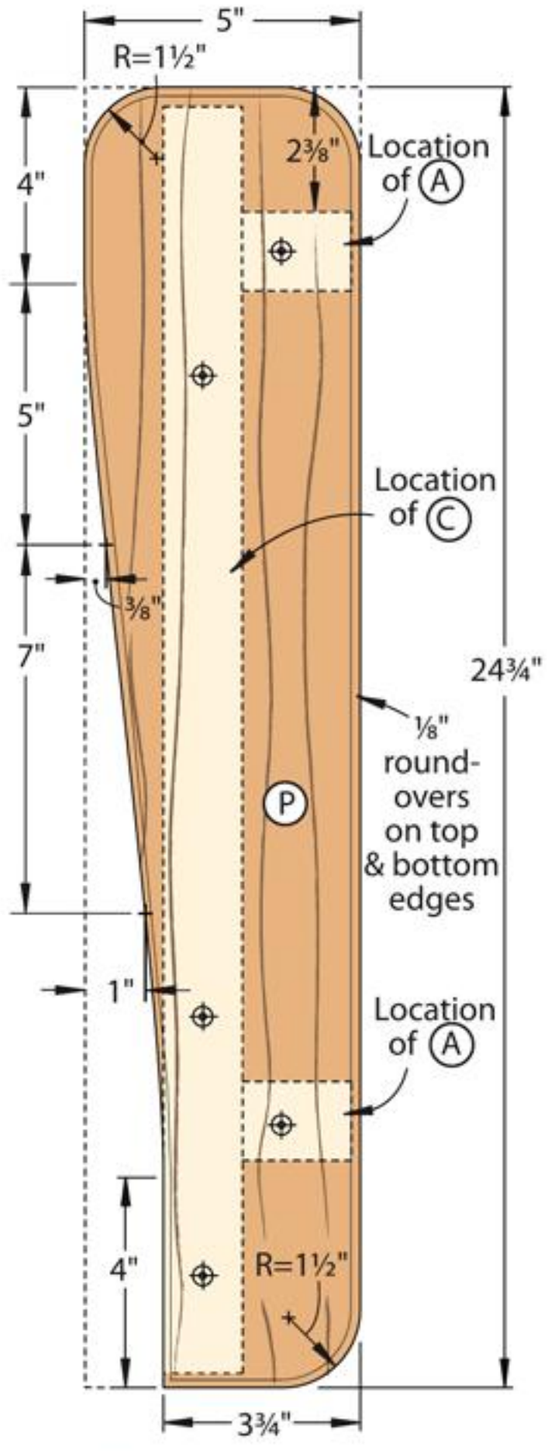
ers. Clamp six splats together with their bottom edges flush and spacers between them [**Photo J**]. Flex a thin strip to lay out the arc along the top of the assembly [**Drawing 5**]. Cut the arc, then set the pieces aside and repeat the process for the remaining six splats. Rout ⅛" round-overs around both faces except the bottom edges, then sand the splats to 150 grit.

2 Clamp a scrap below the lower back rail (H) to support the splats (M) and spacers for one side of the glider [**Photo K**]. Screw the splats in place [**Drawing 5**]. Repeat to secure the remaining splats.

3 Using an 8"-long ¼" drill bit (found at home centers), bore two holes through each leg (A), centered on their thickness [**Drawing 1; Shop Tip,** *opposite*]. Secure a



5 SEAT BACK



6 LEFT ARM (Right arm is mirror image)

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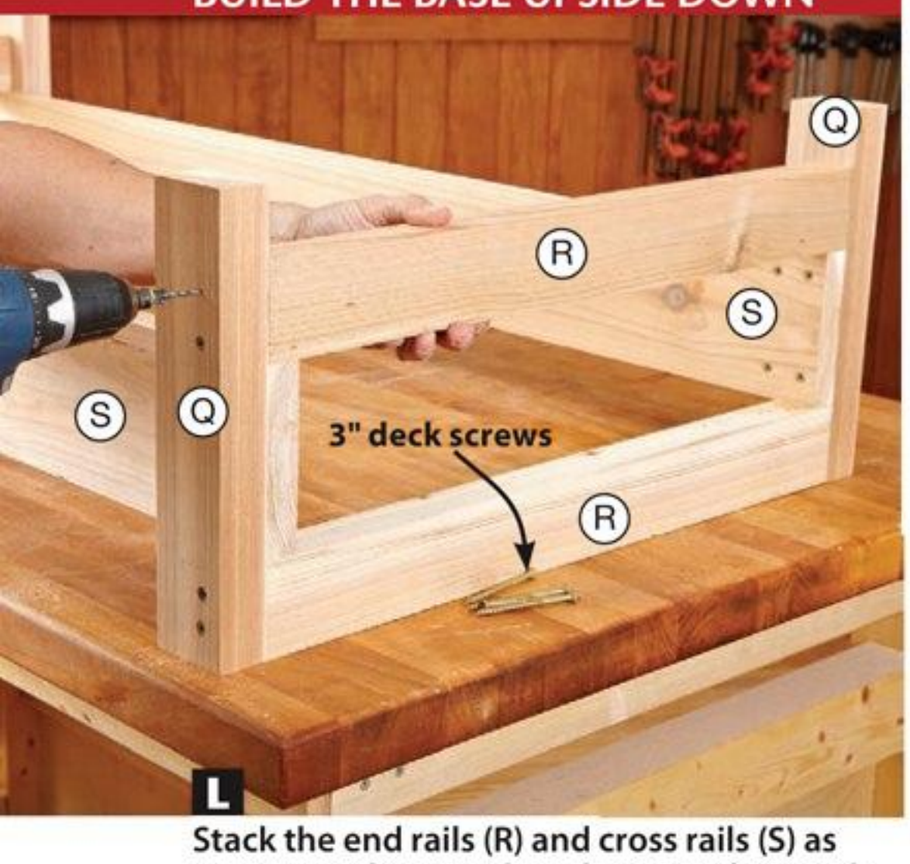
BUILD THE BASE UPSIDE DOWN

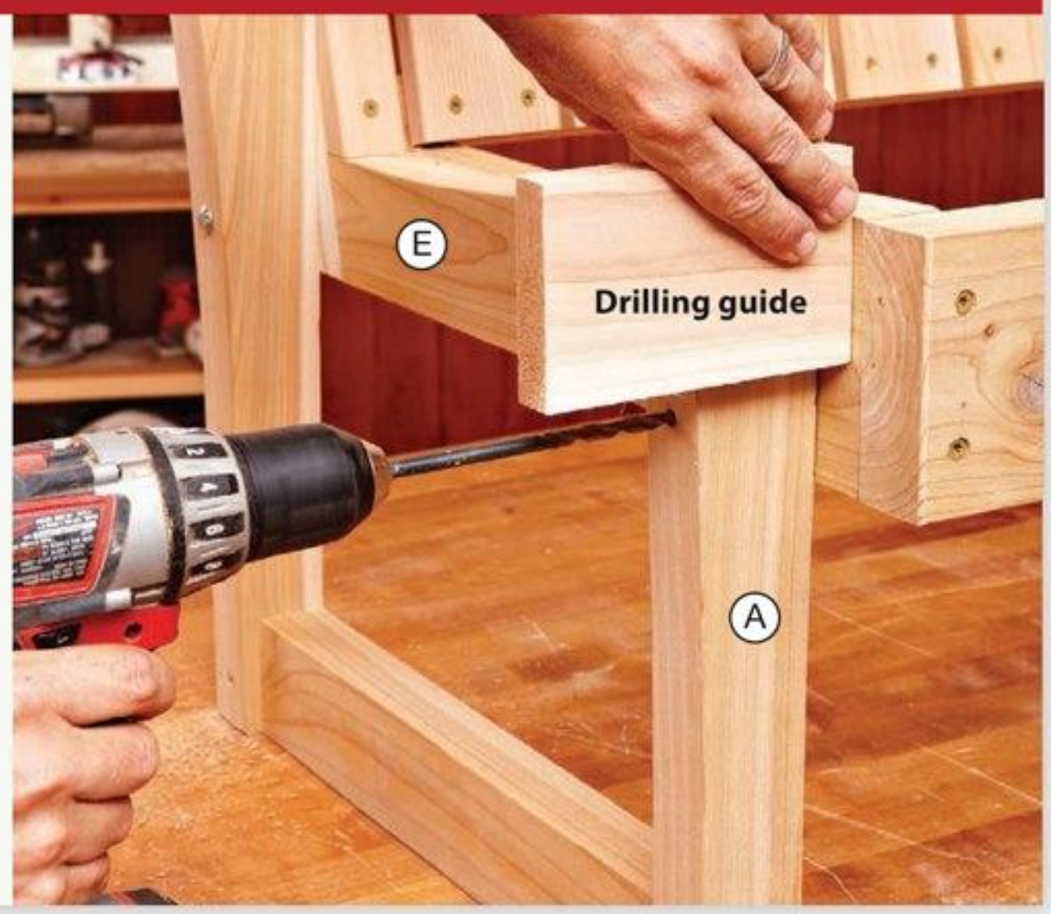


Stack the end rails (R) and cross rails (S) as you screw them in place, keeping their ends and faces flush.

SHOP TIP

Drilling true

Cut a length of scrap to use as a guide when drilling with a long bit. By keeping the bit parallel to both the face of the block and the bottom edge, you'll drill straight and true through the leg (A), end seat rail (E), and end-rail brace (F).



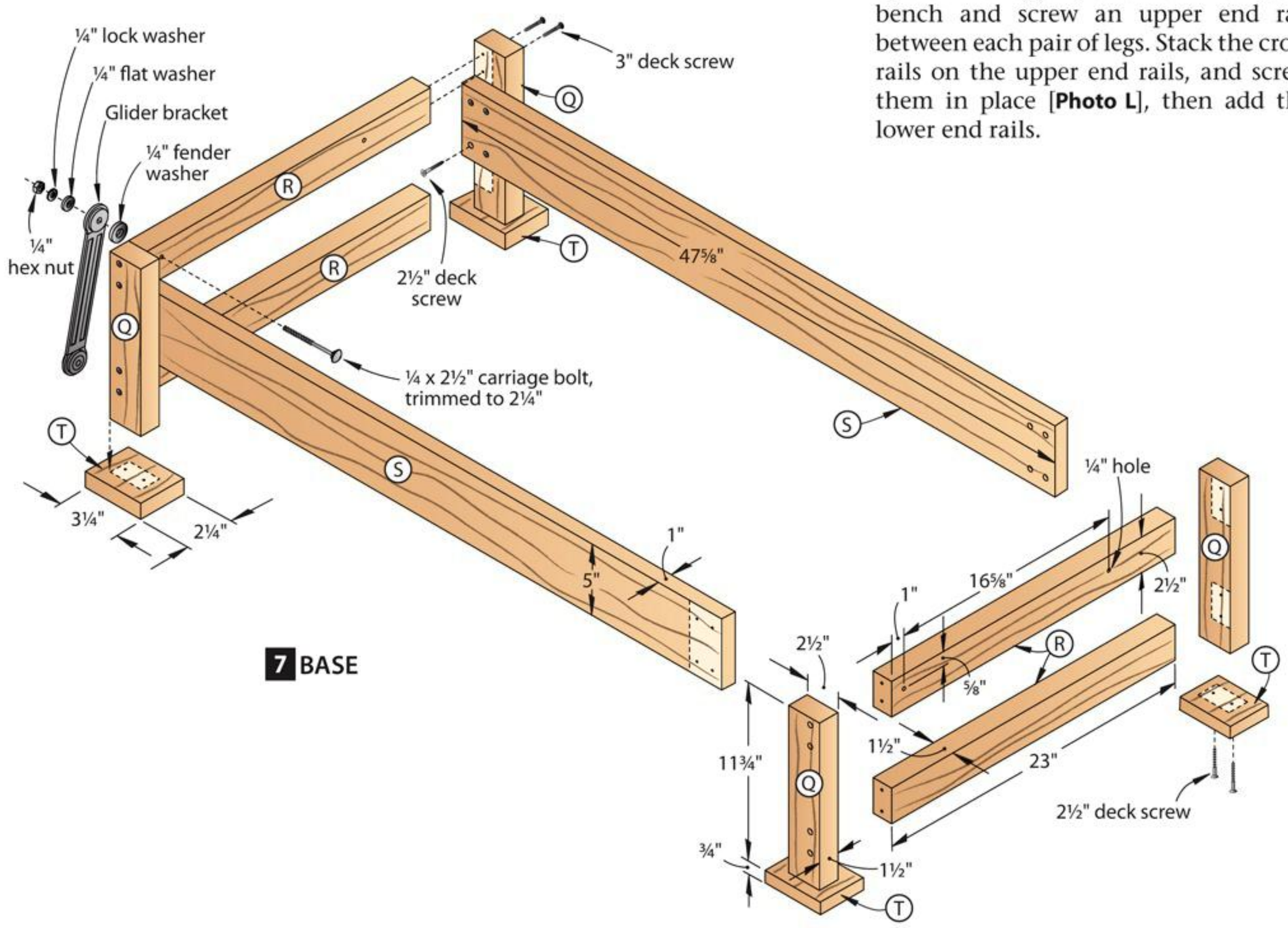
5½" carriage bolt in each upper hole with a flat washer, lock washer, and nut.

4 Rip and crosscut the front slat (N) and the slats (O) to size [**Drawing 4, Materials List**]. Rout ⅛" round-overs on the top faces, and sand them to 150 grit. Cut ten 5/16"-thick spacers to use when installing the slats. Starting with a spacer at the rear, alternate spacers and slats to check the fit. Screw the slats in place, centering the front slat on the length of the front rail (I).

5 From 1"-thick stock, cut the arms (P) to size [**Drawing 6**]. Lay out the points for the curve on the inside edge and flex a thin scrap to connect the points. Lay out the rounded corners where shown and cut the arms to shape. Then rout ⅛" round-overs on both faces. Sand the arms to 150 grit, then screw them in place.

Make a base

1 Cut the legs (Q), end rails (R), cross rails (S), and feet (T) to size [**Drawing 7**]. Set the legs upside down on your bench and screw an upper end rail between each pair of legs. Stack the cross rails on the upper end rails, and screw them in place [**Photo L**], then add the lower end rails.



7 BASE

2 Center a foot (T) on each leg and screw them in place [**Drawing 7**]. Flip the base over and drill the holes in the upper end rails (R) for the glider hardware.

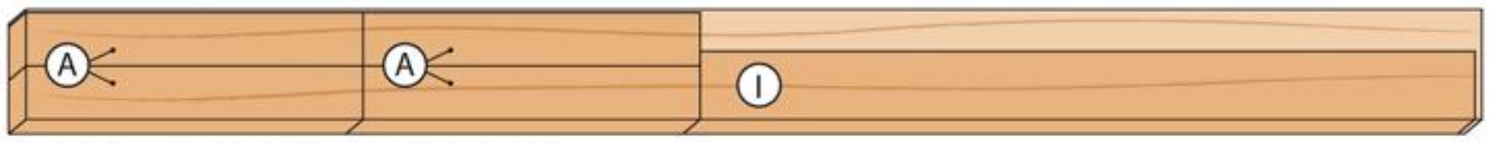
3 Feed a ¼×2½" carriage bolt through each hole in the upper end rails (R), then add a fender washer, glider bracket, flat washer, lock washer, and nut. With a hacksaw, cut off the excess bolt length. Place the seat (A–P) over the base and, using the same combination of hardware as before, secure the legs (A) to the glider brackets [**Drawing 1**]. Cut the bolts flush with the nuts using a hacksaw.

4 Remove the hardware, splats (M), and slats (N, O), and apply a finish.

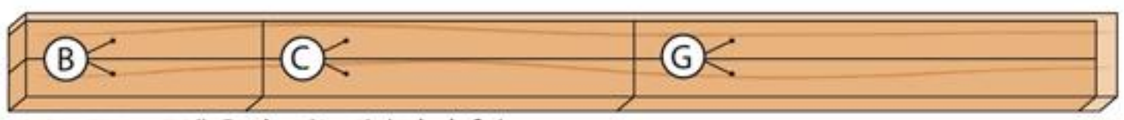
Quick Tip! For best appearance, label hidden areas. To make reassembly easier, as you remove each slat and splat, label its location on the back face, where it will be hidden when reinstalled. (We applied Cabot Wood-Toned Deck and Siding Stain no. 9202, Cedar, using a 2"-wide foam brush, then wiped off the excess, and allowed it to dry overnight.) Reassemble the glider following your labels, and rock on.

Produced by **Craig Ruegsegger** with **Jeff Mertz**
Project design: **Jeff Mertz**
Illustrations: **Lorna Johnson**

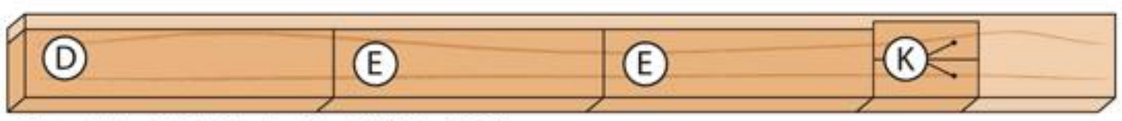
Cutting Diagram



1½ x 7¼ x 96" Cedar (2x8) (10.7 bd. ft.)



1½ x 5½ x 72" Cedar (2x6) (6 bd. ft.)



1½ x 5½ x 72" Cedar (2x6) (6 bd. ft.)

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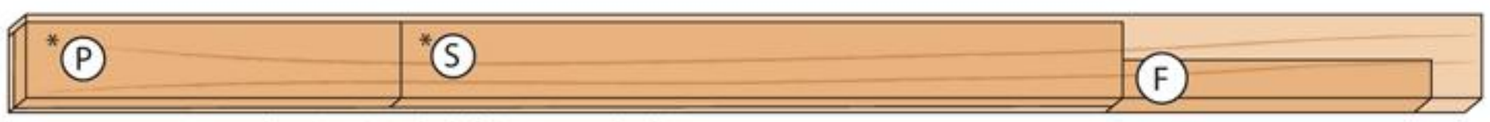
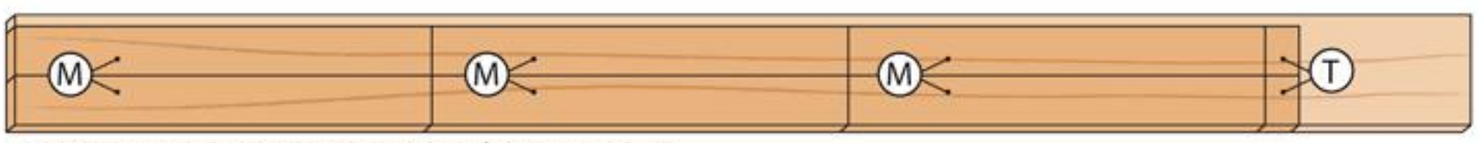
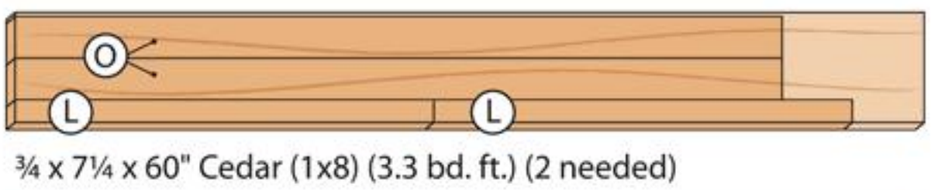


1½ x 5½ x 96" Cedar (2x6) (8 bd. ft.) (2 needed)
* Plane or resaw to the thickness listed in the Materials List.

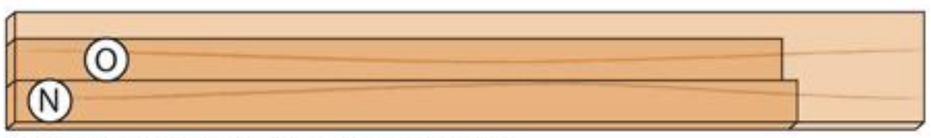
1½ x 5½ x 72" Cedar (2x6) (6 bd. ft.)



¾ x 7¼ x 96" Cedar (1x8) (5.3 bd. ft.) (2 needed)



¾ x 7¼ x 60" Cedar (1x8) (3.3 bd. ft.) (2 needed)



¾ x 7¼ x 60" Cedar (1x8) (3.3 bd. ft.)

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Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Seat						
A*	legs	1½"	3½"	21¾"	C	4
B*	lower rails	1½"	2½"	15⅛"	C	2
C*	arm rails	1½"	2½"	24"	C	2
D*	center seat rail	1½"	4¼"	19⅞"	C	1
E*	end seat rails	1½"	4¼"	17 5⁄16"	C	2
F*	end-rail braces	1½"	2½"	19⅞"	C	2
G*	uprights	1½"	2½"	30"	C	2
H*	back rails	1½"	2½"	47⅝"	C	2
I*	front rail	1½"	4¼"	50⅝"	C	1
J*	lower splat fillers	1½"	2½"	18"	C	2
K*	upper splat fillers	1½"	2½"	6 7⁄16"	C	2
L	narrow splats	¾"	1½"	27⅝"	C	4
M	splats	¾"	3¼"	27½"	C	12
N	front slat	¾"	2¾"	51⅝"	C	1
O	slats	¾"	2¾"	50⅝"	C	5
P	arms	1"	5"	24¾"	C	2
Base						
Q	legs	1½"	2½"	11¾"	C	4
R	end rails	1½"	2½"	23"	C	4
S	cross rails	1"	5"	47⅝"	C	2
T	feet	¾"	3¼"	2¼"	C	4

*Parts initially cut oversize. See the instructions.

Materials key: C–cedar.
Supplies: 1⅝", 2½", 3" deck screws; ¼" flat washers (12); ¼" fender washers (8); ¼" lock washers (12); ¼" hex nuts (12); ¼×2½" carriage bolts (4); ¼×3" carriage bolts (4); ¼×5½" carriage bolts (4).
Bits: ⅛" round-over router bit; 3⁄32", ¼×8" drill bits, countersink.

Source

Glider bracket hardware: No. 58330 $27.99, Rockler Hardware, 800-279-4441, rockler.com.

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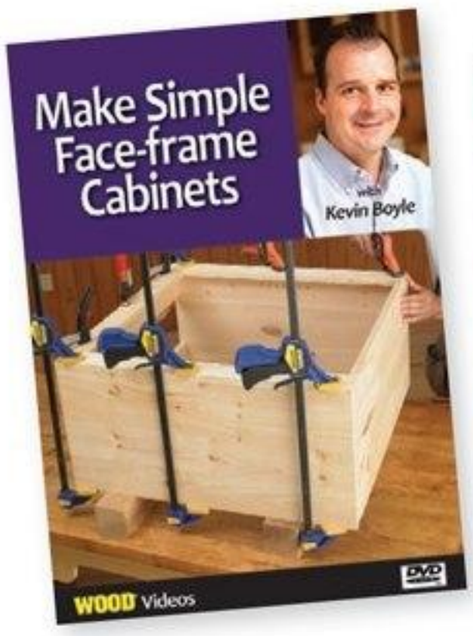

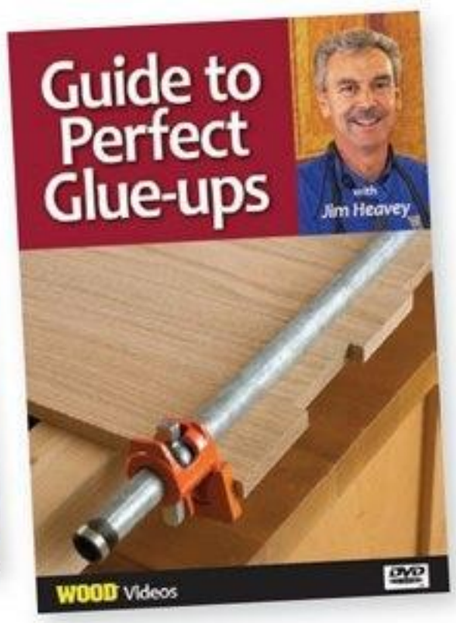

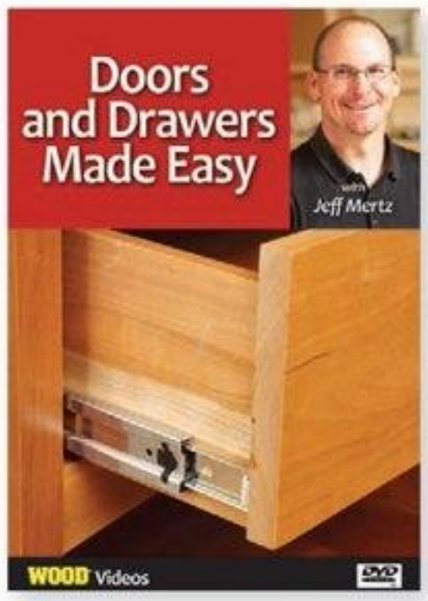

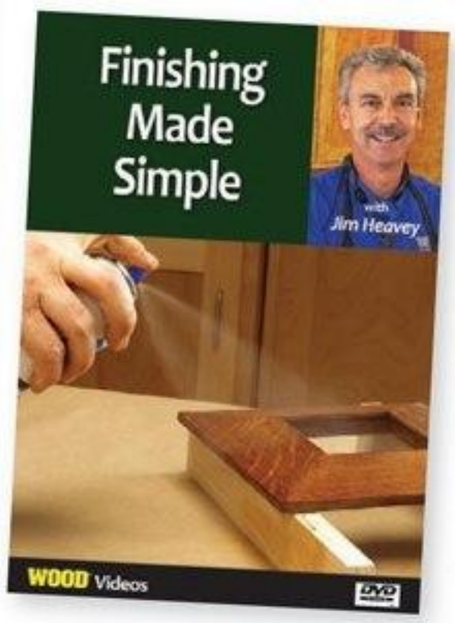

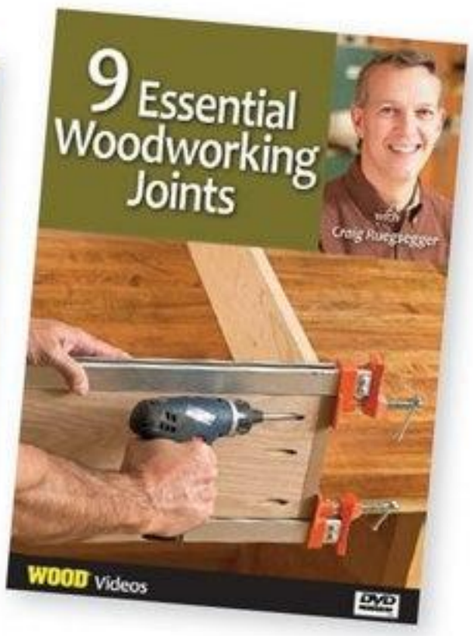

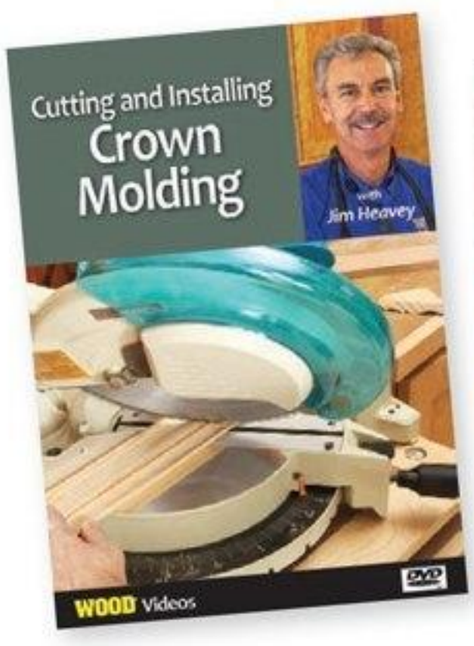

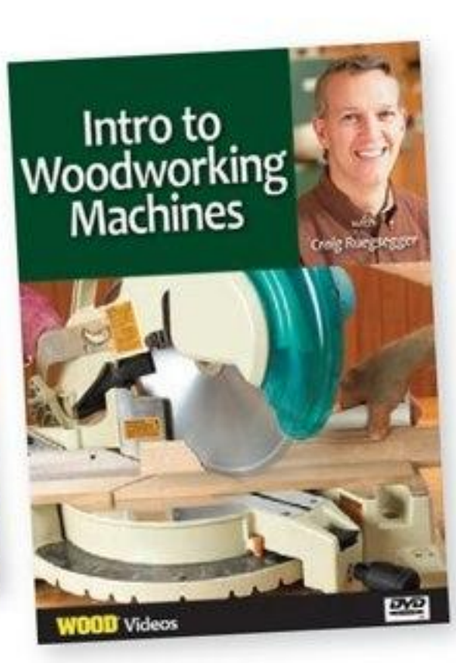

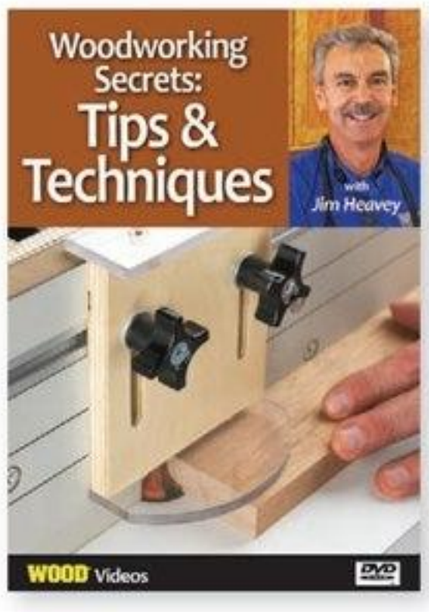

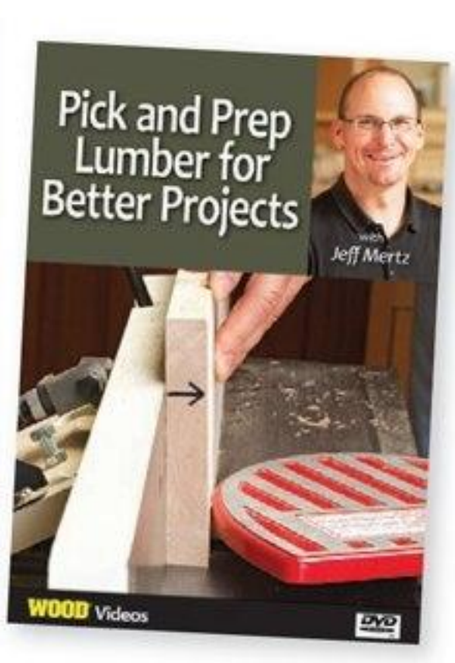

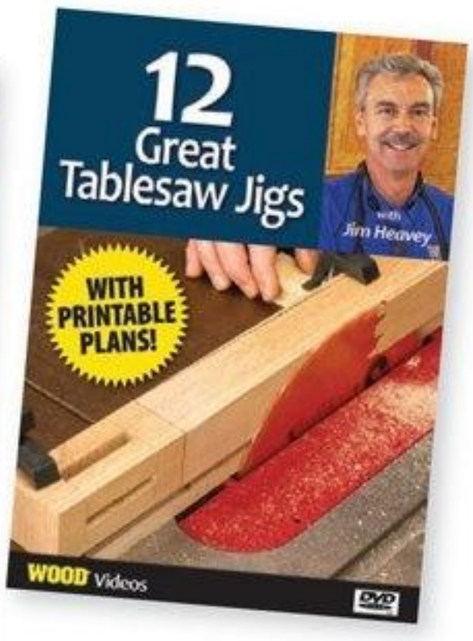

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Scrollsawn Potpourri Box

A weekend project that makes great scents.

The decorative cutouts in this box's lid allow fragrances to drift out freely. But if potpourri isn't your thing, this project also serves well as a small jewelry or catchall box, or a desktop paper-clip caddy.

The secret to getting tight joints all the way around this project? A miter-gauge stopblock and testing your setups on scrap first. The resulting gap-free fit makes the extra effort well worth it.

Begin with long blanks

1 Prepare a ⅜×2½×16" blank for the box sides (A) and a ¼×1×18" blank for the lid sides (B). With a rip blade in your tablesaw, cut the ⅛" grooves on the inside faces of the blanks [**Drawing 1**]. Change to a ½" dado blade, attach an auxiliary face to the rip fence, and position the auxiliary fence next to the blade. Cut the rabbet on the top outside face of the box-sides blank.

2 Switch to a combination or crosscut blade and crosscut six 2½"-long pieces from the box-sides (A) blank and six 2¾"-long pieces from the lid-sides (B) blank. Number the pieces so they can be assembled in the same order in which they were cut from the blanks. Cut six more 2¾"-long pieces from scrap for testing the bevel angle in the next step. (The scrap can be any thickness.)

3 Install a zero-clearance insert in your tablesaw and tilt the blade to 30°. Attach an extension to your miter gauge. Bevel-cut one end of each test piece, removing as little length as possible. Then, attach a stopblock to the extension and bevel-cut the opposite end of each test piece [**Photo A**]. Dry-fit the test pieces, check the fit of the joints, and adjust the blade tilt as needed. Once the joints fit tightly, remove the stopblock and bevel-cut one end of each of the box sides (A) and lid sides (B). Reattach the stopblock and cut the box sides 2⅜" long [**Drawing 1**]. Reset the stopblock and bevel-cut the lid sides 2½" long.

TEST YOUR BEVEL SETTING

Cut six identical-length pieces to check your tablesaw setup. Use a pencil as a hold-down to keep your fingers away from the blade.

Shape the sides and top it off

1 Lay out the arch at the bottom of each box side (A) [**Drawing 1**], and cut and sand them to shape. ***Quick Tip! Stack 'em up for identical arches.*** Stick the pieces together with double-faced tape and sand them all together using a sanding drum in your drill press.

2 For the bottom (C), use a compass to draw a 4⅛"-diameter circle on ⅛"-thick birch plywood. Then follow the steps shown *opposite* to draw a hexagon. For the lid panel (D), choose and make a copy of a **Lid Pattern** from the *WOOD Patterns*® insert and spray-adhere it to ¼" mahogany, flush with an edge and one end. Attach an extension to your miter gauge, pivot the head to 30°, and cut the bottom and lid to size [**Photo B**].

3 Lower the tablesaw blade to ⅛" above the table, add an auxiliary face to the rip fence, and rabbet the top face of the lid panel (D) [**Photo C**]. Dry-fit the lid panel and bottom (C) with the box sides (A) and lid sides (B) to check their fit.

4 Drill ⅛" access holes in each shaded area of the lid pattern. With a #2 blade in your scrollsaw, cut out the pattern. Remove the pattern with mineral spirits, then sand the openings and both faces to 220 grit.

5 Sand the remaining box pieces to 220 grit. Lay two 20"-long strips of blue painter's tape on your bench, sticky

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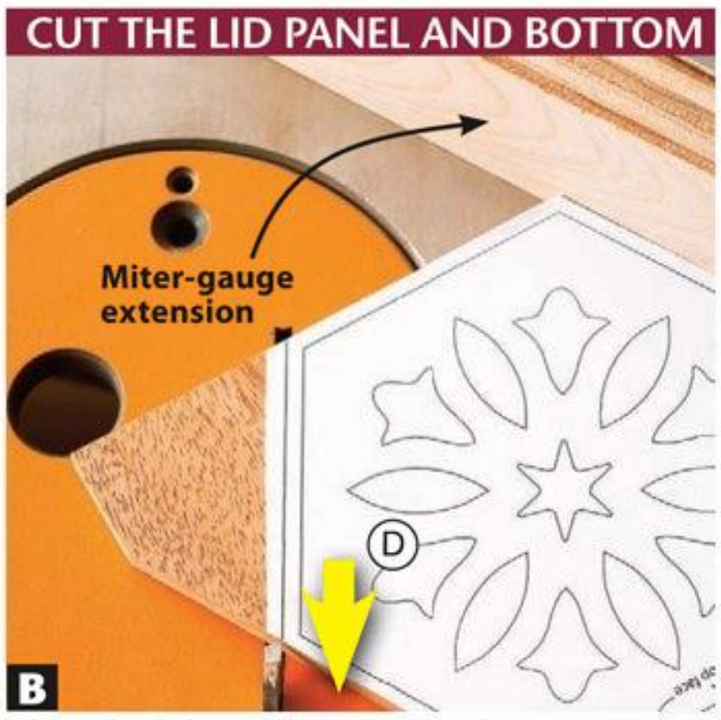
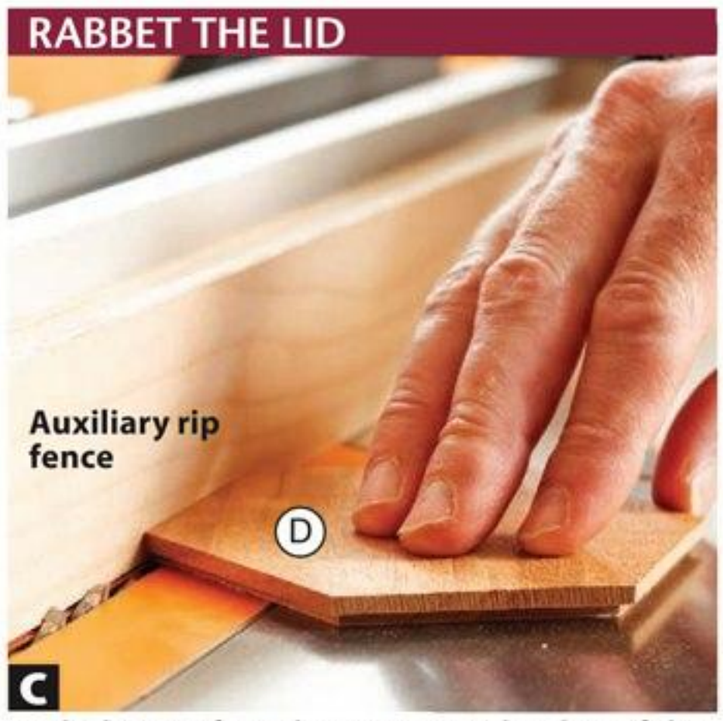
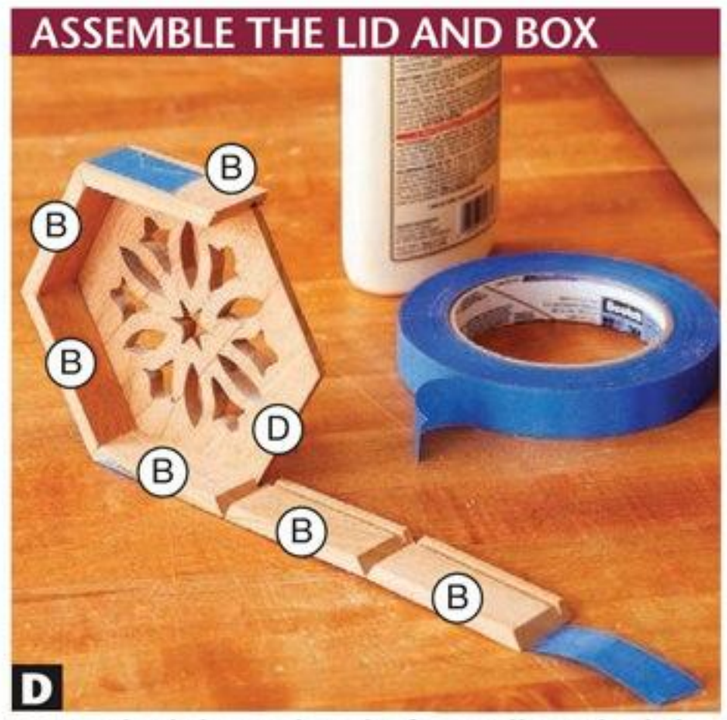


Align the lid-panel (D) pattern lines and your layout lines on the bottom (C) with the blade. A miter-gauge extension guides the piece.



With the top face down, run each edge of the lid panel (D) against the auxiliary rip-fence face to cut the rabbet.

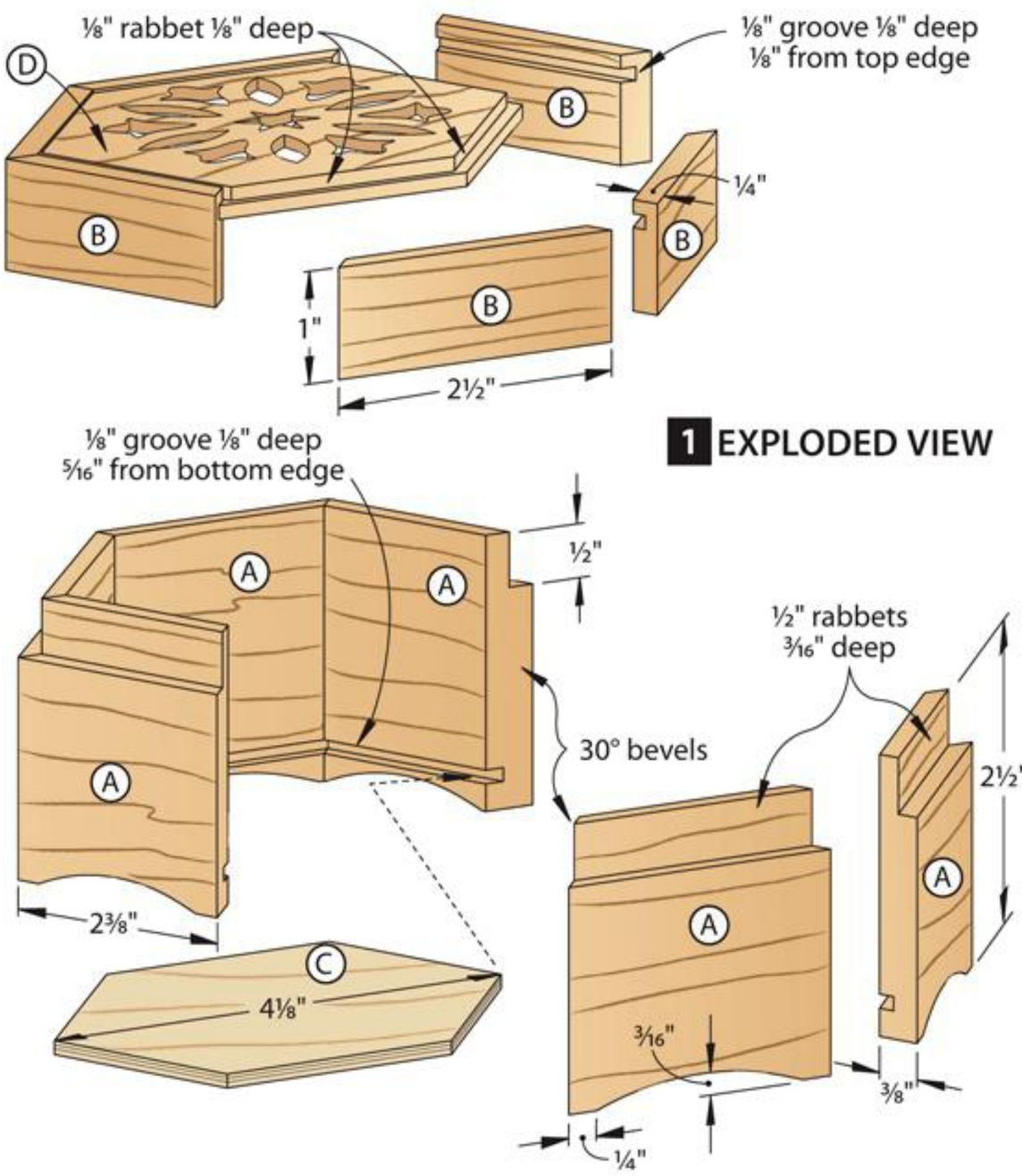


Insert the lid panel (D) before rolling the lid sides (B) up completely. Painter's tape works as a band clamp and holds each joint tight.

side up. Align the box sides (A) on one strip of tape and the lid sides (B) on the other, end to end with the bevels up. Working on one assembly at a time, brush glue onto each bevel and put two drops in each groove, then roll up the sides [**Photo D**]. Check the fit of each joint and for an even reveal around the lid panel (D), then set the assemblies aside to dry.

6 Apply a finish. We sprayed on two coats of satin polyurethane to reach into the inside corners and the lid cut-outs. Fill with potpourri.

Produced by **Craig Ruegsegger** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**



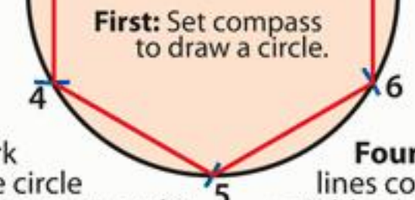
1 EXPLODED VIEW

Hexagons start round

To lay out an equilateral hexagon (a figure with six equal-length sides), use a compass to scribe a circle. Without changing the compass setting, place the compass pivot at the top of the circle (1 in the drawing *below*), and swing the compass to mark points 2 and 3. Then place the pivot at point 3 to mark point 4, move to 4 to mark point 5, and to 5 to mark point 6. Create a hexagon by drawing lines to connect each point with the next.

Watch a free video of this technique at woodmagazine.com/hexagon.

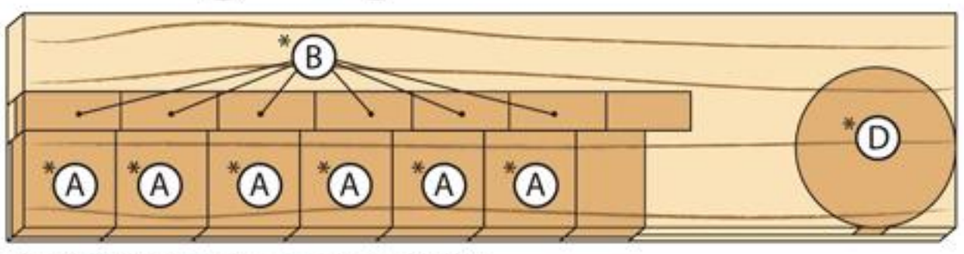
Second: With the compass at point 1, strike points 2 and 3.



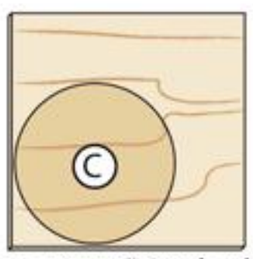
Third: Work around the circle striking points 4, 5, and 6.

Fourth: Draw lines connecting neighboring points.

Cutting Diagram



½ x 5½ x 24" Mahogany (.5 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.



⅛ x 6 x 6" Birch plywood

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	box sides	⅜"	2½"	2⅜"	M	6
B*	lid sides	¼"	1"	2½"	M	6
C	bottom	⅛"	3⅝"	4⅛"	BP	1
D	lid panel	¼"	4"	4⅝"	M	1

*Parts initially cut oversize. See the instructions.

Materials key: M–mahogany, BP–birch plywood.
Supplies: Spray adhesive.
Blades and bit: Stack dado blade, #2 scrollsaw blade; ⅛" drill bit.

SHOP TESTED

Biscuit Joiners

These handy tools make joining boards a snap, but only a select few do the job with maximum accuracy and minimum fuss.

If you're looking for a power tool that quickly and accurately joins two pieces of wood, get a biscuit joiner. Among the many joints these machines help you tackle: edge-to-edge, end-to-edge, and miter-to-miter. Biscuit joiners have been around since the late 1960s and continue to help craftsmen create strong joints held with pressed-wood biscuits and glue. (Learn how to make these joints in "Biscuiting Basics" on *page 40*.) We tested six popular machines, and here's what we found.

2 ways to cut dead-on slots

Depending on the thickness of the wood and type of joint, you can cut the slots one of two ways. Read on to learn what you need to know to be successful at either method.

■ **Referencing from the base.** For all the biscuit joiners we tested, this method works perfectly when using ¾"-thick stock: You just rest both the tool and board on your workbench, and the tool cuts slots centered and parallel to the base. But if you want to position a slot somewhere other than ⅜" from the face—in the center of a 1½"-thick piece, for example—you must either elevate the joiner with shims under the base or use the fence as your reference surface. (By the way, don't refererence from the fence and base at the same time; it could cause misalignments.)

■ **Referencing from the fence.** Not only is this the preferred method for stock thicker than ¾", it's also the only option for slotting miter joints. As important as this is, the fences proved to be the breaking point for four of the six tested models.

For example, the fences on the DeWalt DW682K and Porter-Cable 557 move up and down on a rack-and-pinion gear that makes adjustments easy and holds the fence parallel to the blade. The other joiners' fences struggled to maintain a parallel plane without further tinkering and fine-tuning, resulting in various degrees of unparallel cuts and misaligned joints.

Scales on the sides of the fences help you position them accurately; if you select 1", for example, your slot will be 1" from the top of the board. Only Triton's front-mounted fence scale proved too inaccurate to rely on [**Photo G**].

As you see in **Photos A–D**, you cut slots in mitered boards by tilting the joiner's

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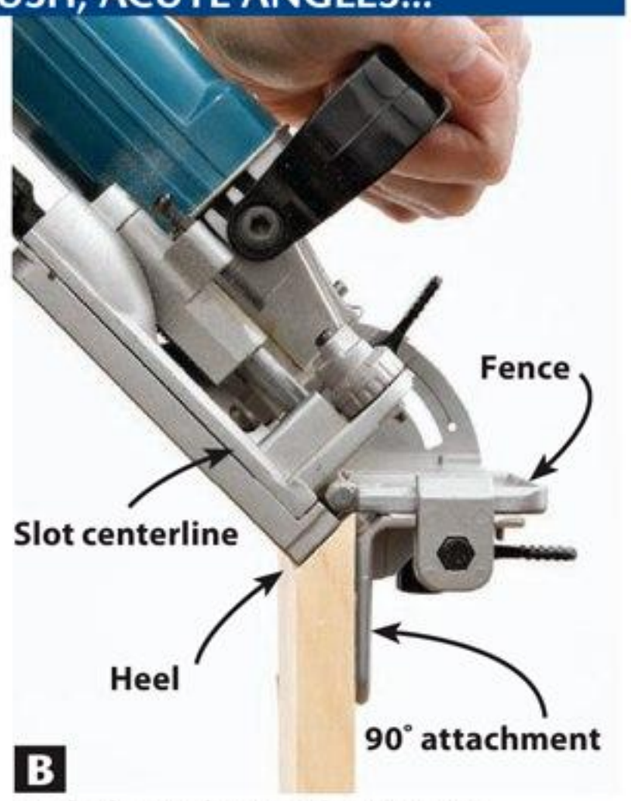
CAPTURE, BUT DON'T CRUSH, ACUTE ANGLES...

A

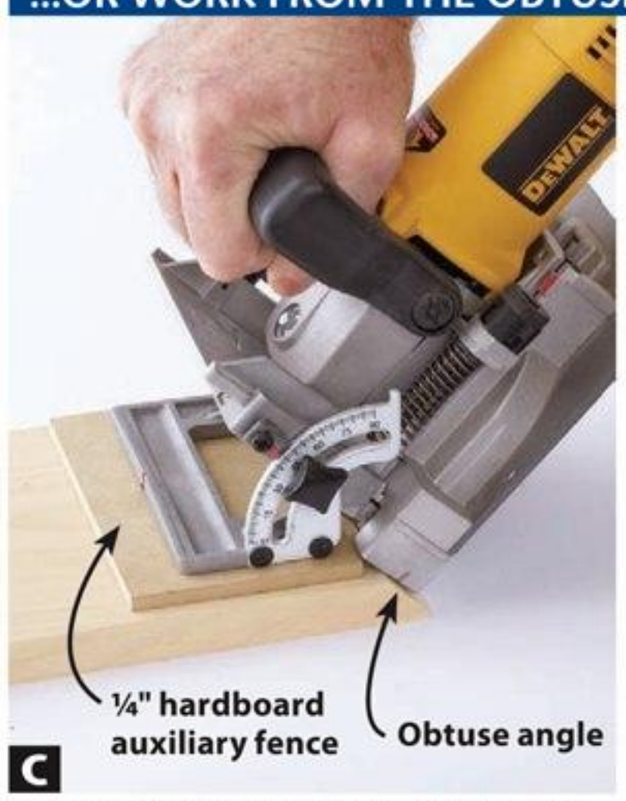
Thanks to its easy-to-use fence, the Porter-Cable can be aligned easily to cut slots while captured around the acute angle of a miter.



B

With the Makita and Triton, it's difficult to cut the slot nearer the heel without the fence assemblies crushing the tip of the miter.

...OR WORK FROM THE OBTUSE SIDE



C

To cut slots in miters with the DeWalt, you attach an auxiliary hardboard fence using double-faced tape and position the slot near the miter's heel.

D

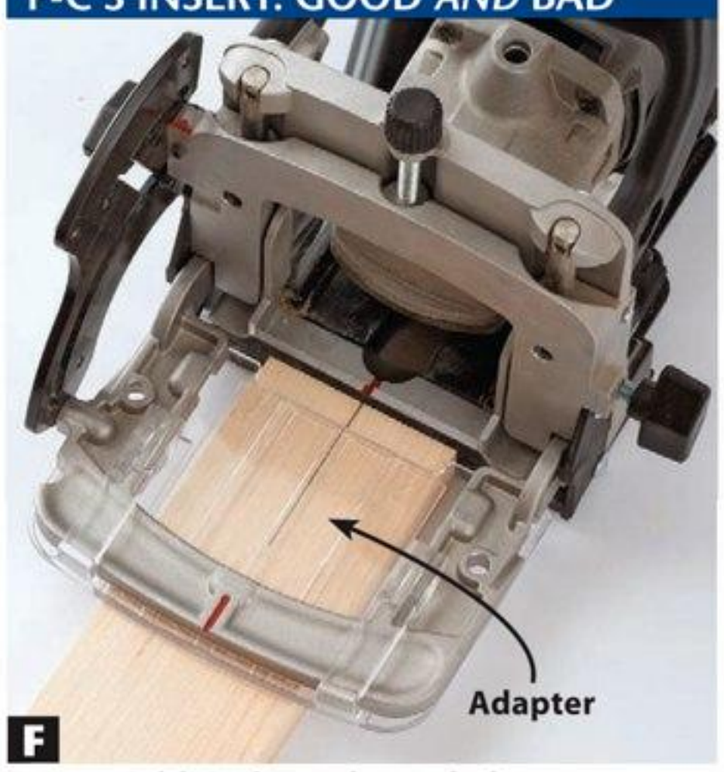
For the same mitered cut with the Makita, you must clip the included plastic adapter onto the tilting fence.

"SEE" THE SLOT BEFORE YOU CUT

E

Ryobi and Craftsman joiners help you quickly gauge a biscuit's placement with width markings and centering lines on the fence.

P-C'S INSERT: GOOD *AND* BAD



F

Porter-Cable's clear adapter helps support narrow stock, but we worry that its brittle tabs will break and render it useless.

TOUGH-TO-SET-ACCURATELY FENCE

G

You adjust Triton's 90° fixed fence up and down by hand, aligning the desired height settings in each of the two indicator windows.

fence to your desired setting. Porter-Cable's fence, our favorite, tilts from 0° to 135° with positive stops at 45° and 90°, as well as an easy-to-read scale. The 135° setting allows you to capture the acute angle of a mitered workpiece for a secure grip [**Photo A**]. Fences on the Craftsman 17539 and Ryobi JM82K also tilt to 135°, but plastic support plates restrict movement and won't work in stock less than ¾" thick.

The Makita 3901 and Triton TC9BJM each use an included right-angle attachment [**Photo B**] that slides onto the fence, which tilts up to 90°. With this accessory attached and the fence tilted to 45°, you can wrap around an acute miter, but both machines proved difficult to use and damaged the fragile wood fibers at the miter's point.

With these two machines and the DeWalt (which does not tilt beyond 90°) we found it easier to cut miter slots by tilting the fences to 45° and cutting instead from the obtuse side of the miter. But to position slots nearer the heel end of the miter rather than the center—where a #20 cut will break through the opposite face—you have to attach an auxiliary fence [**Photos C, D**]. None of the owner's manuals for these tools mention this, however.

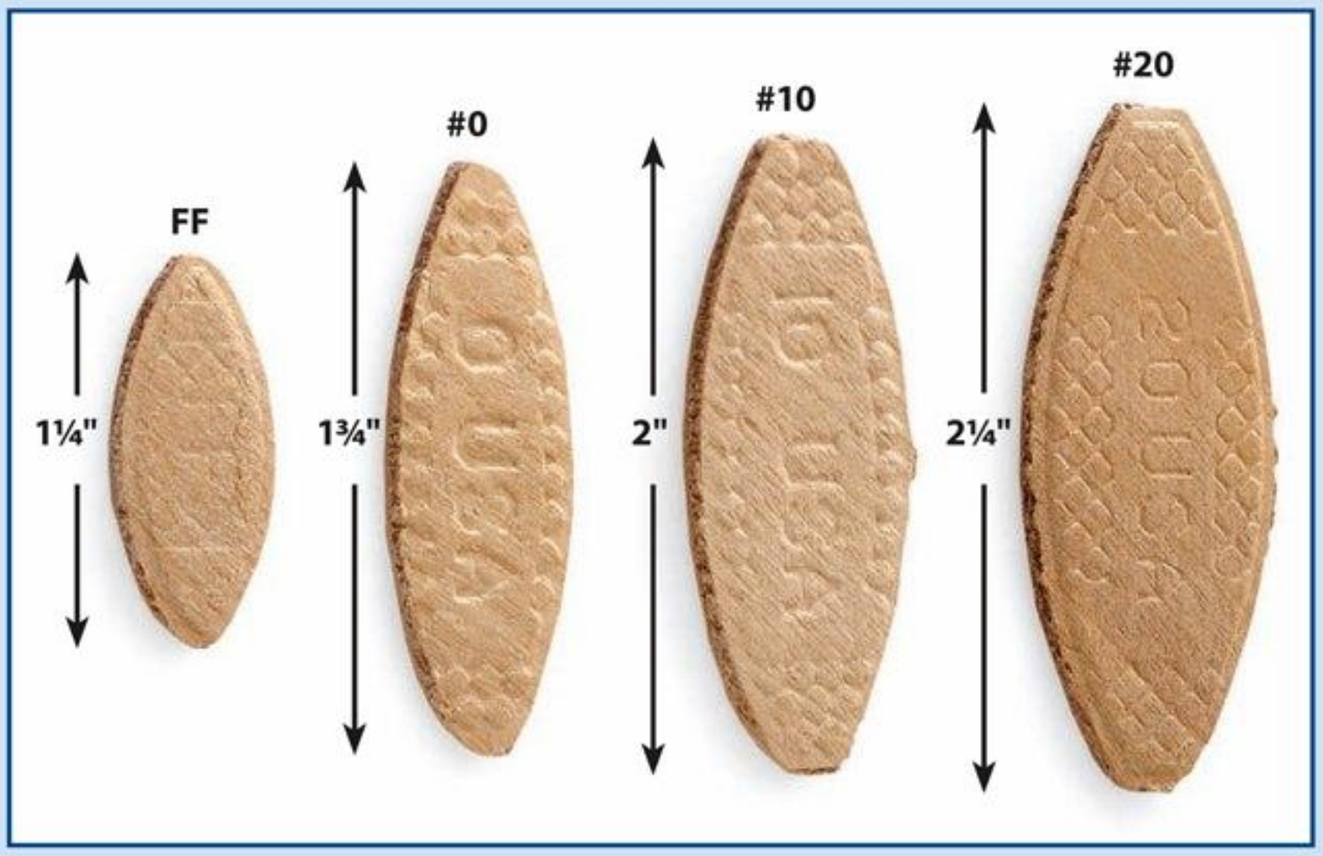
Set your sights on accuracy

■ **Aim for snug-fitting slots.** Sometimes a little looseness in the fit between slot and biscuit can help you overcome minor misalignment of mating slots as you create a joint. (The pressed-wood biscuits expand after absorbing the glue's moisture, tightening the fit.) But too often in our tests, sloppy slots led to uneven joints. We'd rather just get it right the first time with a well-machined slot, and the DeWalt and Porter-Cable best delivered these.

■ **Plunge with precision.** All six joiners feature microadjustable stops for setting the plunge depth for the most common biscuit sizes: #0, #10, and #20. For most woodworkers, those three settings will suffice. Porter-Cable includes a setting (and special blade) for 1¼"-long face-frame biscuits. The other settings (see the chart on *page 42* for details on each joiner's biscuit-depth settings) are geared more for the professional user than the home woodworker and accommodate 3⅜" biscuits (for greater strength) and metal knockdown fasteners.

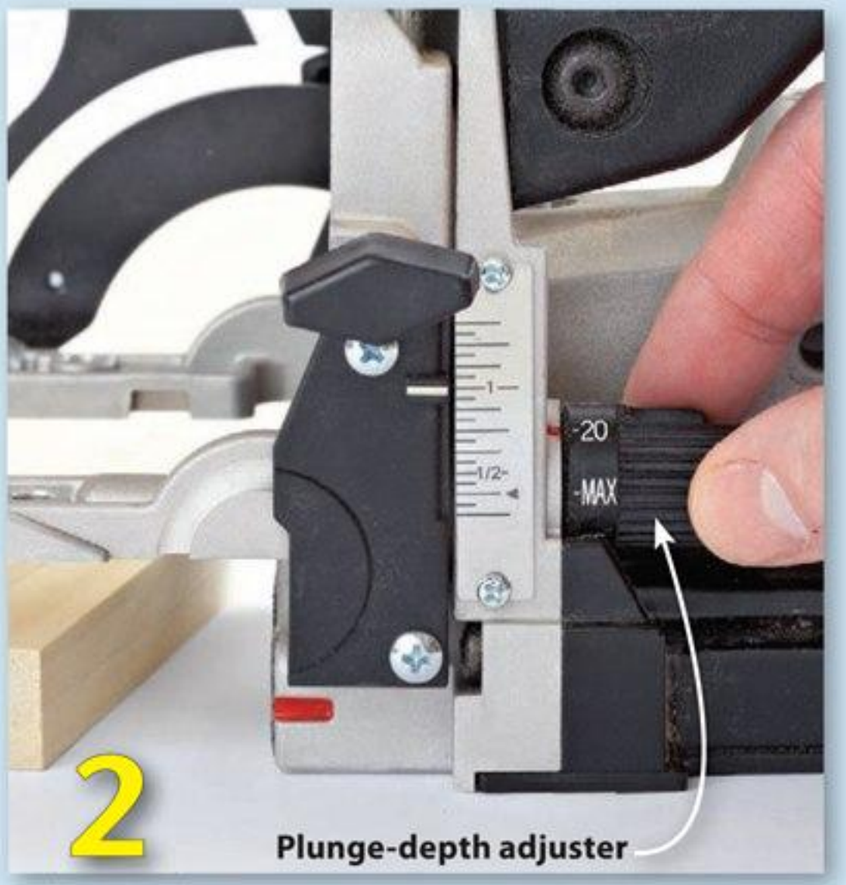
Biscuiting Basics

A biscuit joiner (also known as a plate joiner) cuts half-oval slots in mating workpieces; then you glue in a football-shaped "biscuit" and clamp the joint tightly. (Common biscuit sizes are shown at *right*.) Biscuits add strength to joints and assist you in aligning workpieces. Here's how to set up a joiner to cut a typical joint.



Shown are the common biscuits you'll use for most woodworking projects. Only the Porter-Cable cuts slots for face-frame (FF) biscuits.

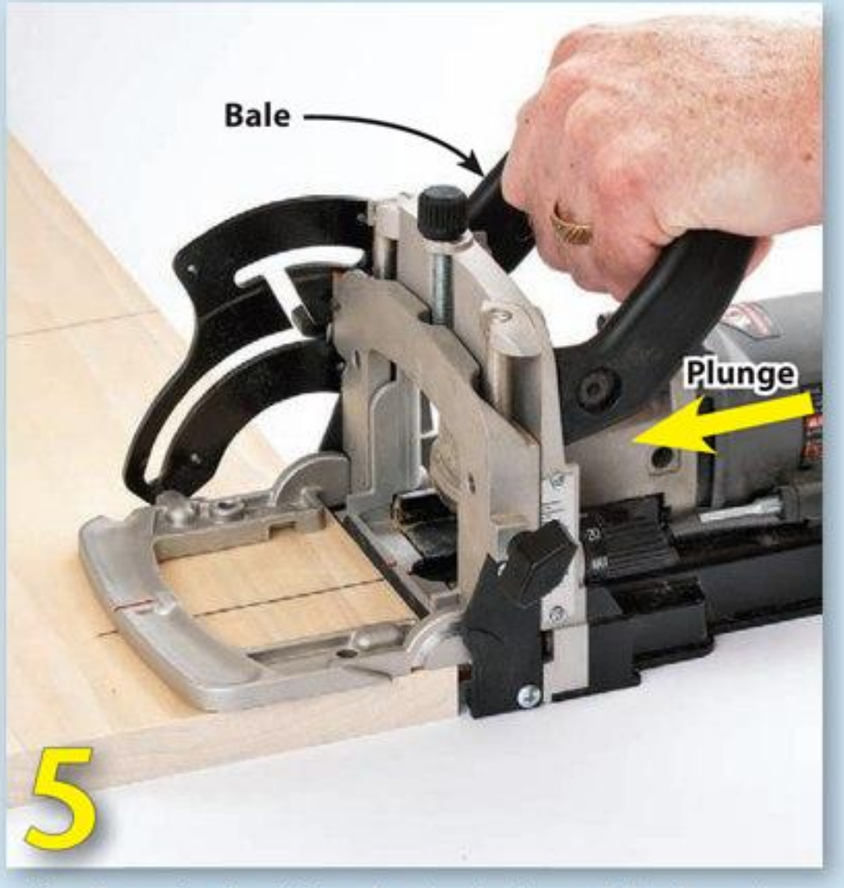
Mark biscuit-slot locations across the joint between two boards you want to join. Mark the first board, then transfer to the second.



Set the plunge-depth adjuster to match the biscuit size. For maximum strength, use the largest biscuit that fits your joint.

Typically, you'll center the slot in the wood. The joiner's base, when sitting on a flat surface, is preset to center the cut in ¾"-thick stock.

Line up the slot-centering marks with your layout line. (Similar markings are on the base's bottom for using it vertically.)



Finally, grip the joiner by the bale and the barrel (or handle), engage the power switch, and plunge the blade into the wood.

After you've cut mating slots in your workpieces, add glue and biscuits and clamp the joint.

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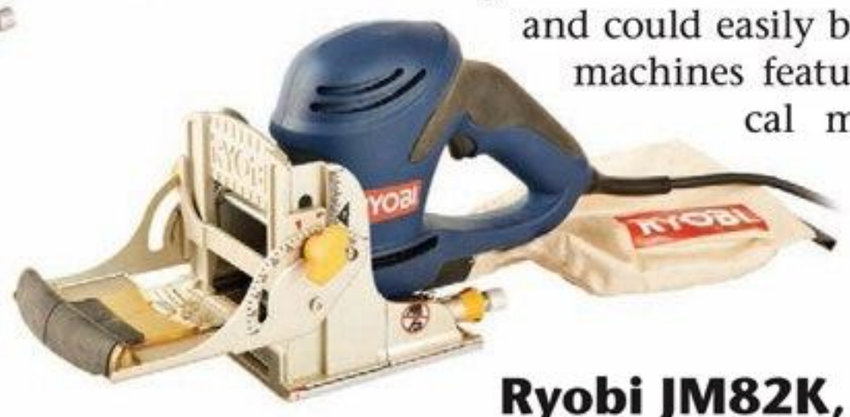
Pass the biscuits, please, and let's dig into the joiners!

Craftsman 17539, $100

800-349-4538, craftsman.com

These tools are nearly identical except for the shape and position of the front bale (handle) on the fence. Both models performed about equally in all aspects. Plastic inserts in the center of the fences have helpful alignment markings [**Photo E**], but these inserts seem flimsy and could easily break. Both machines feature a vertical motor that places the pistol-grip trigger about 4" above the blade—elevating the point where you control the tool—and makes plunging the blade awkward. It's too easy to tilt the machine when plunging and accidentally widen the slot. And the 8-tooth blades prove a little harder to plunge into wood than the 6-tooth blades on the other models. They're also the heaviest tools in the test at nearly 8½ pounds. Dust collection proved among the best with both models.



Ryobi JM82K, $100

800-525-2579, ryobitools.com

DeWalt DW682K, $200

800-433-9258, dewalt.com

The DW682K proved accurate in every cut we made, with spot-on slot placement and biscuit fit. And it has a smooth plunge action. The lightest tool in the test at just under 7 pounds, it feels nicely balanced with a comfortable grip. Still, it has a few issues. Mitered cuts require the auxiliary fence spacer, and two retractable antislip bumpers on the nose add little grip to a board, letting the tool slip sideways during a cut if you're not careful. Dust collection proved good, but a square port on the base would be tough to hook up to if you lose or break the included plastic adapters for the dust bag and a shop vacuum.

Makita 3901, $220

800-462-5482, makitatools.com

This lightweight, nimble tool works great for cutting slots when referencing from its base, and it has a smooth plunge action. But the fence's cam-action locking lever moves the fence out of parallel with the blade when you lock it down. As a result, we had a tough time making accurate cuts when referencing from the fence, regardless of the angle. The turret depth stop spins so loosely we accidentally bumped it to the "max" setting when making a vertical cut, and cut slots through our test board and into the benchtop. You'll get better dust collection using a shop vacuum than the bag. Finally, the slide-style power switch proves less comfortable than triggers on the other barrel-grip machines.

Triton TC9BJM, $130

800-624-2027, tritontools.com

Another tool with a smooth plunge and dead-on alignment when referencing from its base, the Triton also has a comfortable grip. But the powerful 9-amp motor is overkill; its bulk makes this tool feel clumsy. We found the right-angle fixed fence [**Photo G**] cumbersome to set and the scale inaccurate, and if you want to store the tool in its plastic case, you have to remove the fence—losing any accurate setup you had gained. Its blade cut sloppy slots with burnt walls; that leads to poor glue bonds. And the antislip nose bumpers do little good. A tight dust chute impaired debris collection, even with a shop vacuum attached.

Porter-Cable 557, $225

888-848-5175, portercable.com

With the most comprehensive depth-stop settings, this machine cuts slots for multiple biscuit sizes as well as for metal knockdown fasteners and specialty hinges. It makes accurate cuts whether using the base or the fence for reference, and it's easy to quickly set the fence angle and height. Coarse sandpaper across the full width of the nose prevents any slippage when making cuts. If you want to use face-frame biscuits, switching to the smaller blade is a breeze, and there's a molded storage spot in the case for the blade you're not using. Because the 557's fence has no support in its center cutout, you have to clip on a plastic adapter when working with boards narrower than 3¾" [**Photo F**]. Dust collection proved its only (minor) setback because of a too-small chute that clogged with chips when using the included bag.

Ready to "join" in? Here's what to buy

To buy a biscuit joiner you'll be able to use accurately and efficiently with little stress, you have to spend at least $200. We simply couldn't get the $100 units to perform without great frustration. (If you buy one of these, expect to do a lot more planing and sanding on the glued-up joints to get them smooth and even.)

By now you've probably figured out that two biscuit joiners stand out from this field of six: the DeWalt DW682K and Porter-Cable 557. They both make accurate cuts, and, aside from a few minor quirks that we can live with, prove easy to use. That's why they share our Top Tool honors. But if you intend to make face-frame joints or want the ease of cutting acute-angle miters, then go with the Porter-Cable.

Produced by **Bob Hunter** with **Matt Seiler**

BISCUIT JOINERS: QUICK AND EASY TOOLS FOR ASSEMBLING ANY PROJECT

BRAND	MODEL	PERFORMANCE RATINGS (1)												MOTOR		BODY STYLE (3)	BLADE		BISCUIT DEPTH SETTINGS (ALL HAVE 0, 10, 20) (5)	FENCE				ACCESSORIES (7)		WEIGHT, LBS–OZ	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (8)	SELLING PRICE (9)
		PRIMARY				SECONDARY																							
		PARALLELISM OF BLADE TO BASE	PARALLELISM OF BLADE TO FENCE	EASE OF ADJUSTING DEPTH STOP	FIT OF BISCUIT IN CUT SLOT	PLUNGE SMOOTHNESS	EASE OF SETTING FENCE HEIGHT	EASE OF TILTING FENCE	DUST COLLECTION WITH BAG	DUST COLLECTION WITH VACUUM	COMFORT AND FEEL	EASE OF CHANGING BLADE	CLARITY OF OWNER'S MANUAL	RATED AMPERAGE	BLADE-DRIVE METHOD (2)		DIAMETER, INCHES	NUMBER OF TEETH (4)		ELEVATION STYLE (6)	TILT RANGE, DEGREES	POSITIVE STOPS, DEGREES	DIMENSIONS, INCHES, L×W	STANDARD	OPTIONAL				
CRAFTSMAN	17539	A	C-	A	C	B+	B	B+	A	A	D	C-	B+	6	D	P	4	8	—	R	0–135	0, 45, 90, 135	5×4¼	B, C, D		8–5	1	C	$100
DEWALT	DW682K	A	A	A	A	A	A-	B	A	A	A	A	B	6.5	G	B	4	6	M	R	0–90	0, 90	4⅝×2½	C, D		6–13	3	M	200
MAKITA	3901	A	D	C-	B	A	D	B-	C-	A-	B-	A	C-	5.6	G	B	4	6	M, S	R	0–90	0, 45, 90	5½×2⅜	A, C, D		6–15	1	C	220
PORTER-CABLE	557	A	A	A-	A	A	A	A	B	A	A	A	A	7	G	B	2, 4	6*	FF, D, M, S	R	0–135	0, 45, 90, 135	5¼×3¾	A, C, D, F	B	7–6	3	M	225
RYOBI	JM82K	A	C	A	C	B+	B	B+	A	A	D	C-	B+	6	D	P	4	8	—	R	0–135	0, 45, 90, 135	5×4¼	B, C, D		8–5	2	C	100
TRITON	TC9BJM	A	D	A	C	A-	D	C	D-	C	B	B+	B	9	G	B	4	6	M	D	0–90	0, 90	5⅞×2⅞	C, D		8–3	3	C	130

NOTES

1. A Excellent; B Good; C Fair; D Poor
2. (D) Direct drive; (G) Gear drive
3. (B) Barrel grip; (P) Pistol grip
4. (*) 2" blade for FF biscuits has 4 teeth.
5. (D) Duplex metal knockdown hinges; (M) Max setting for Lamello S6 biscuit; (S) Simplex knockdown metal fasteners
6. (D) Dovetailed ways; (R) Rack and pinion
7. (A) Fence adapter; (B) Biscuit assortment; (C) Storage case; (D) Dust bag; (F) 2" face-frame blade
8. (C) China; (M) Mexico
9. Prices current at time of article production and do not include shipping, where applicable.

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Better Homes and Gardens®

WOOD® PATTERNS®

July 2011 *Issue 205*

Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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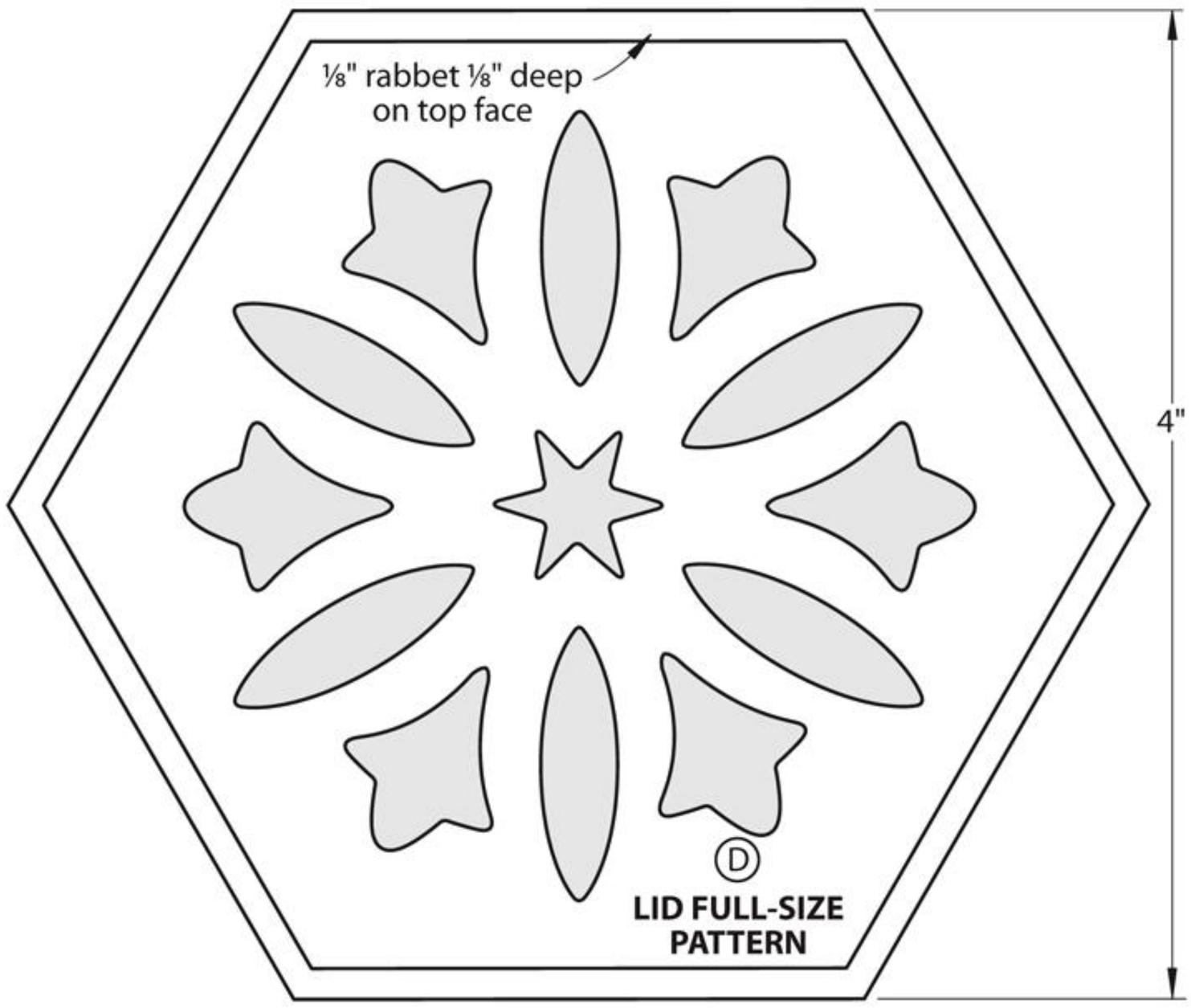
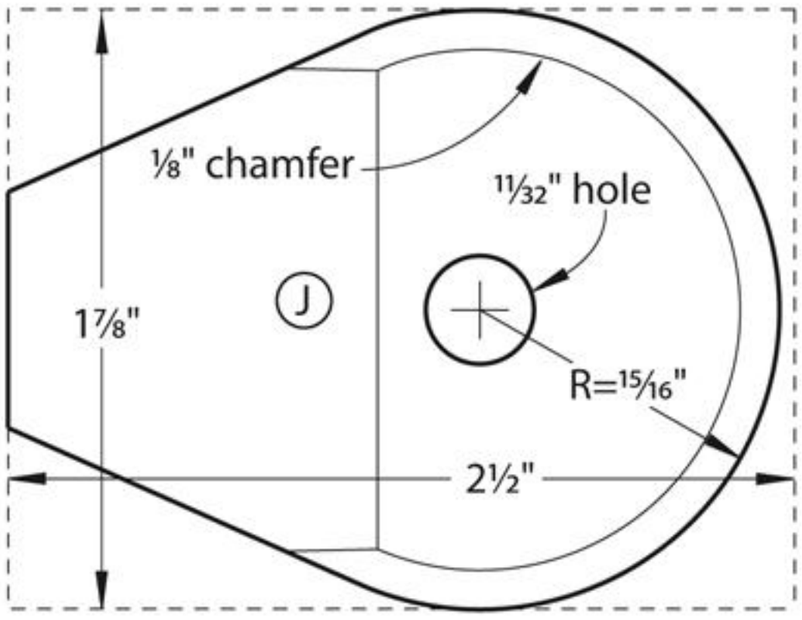
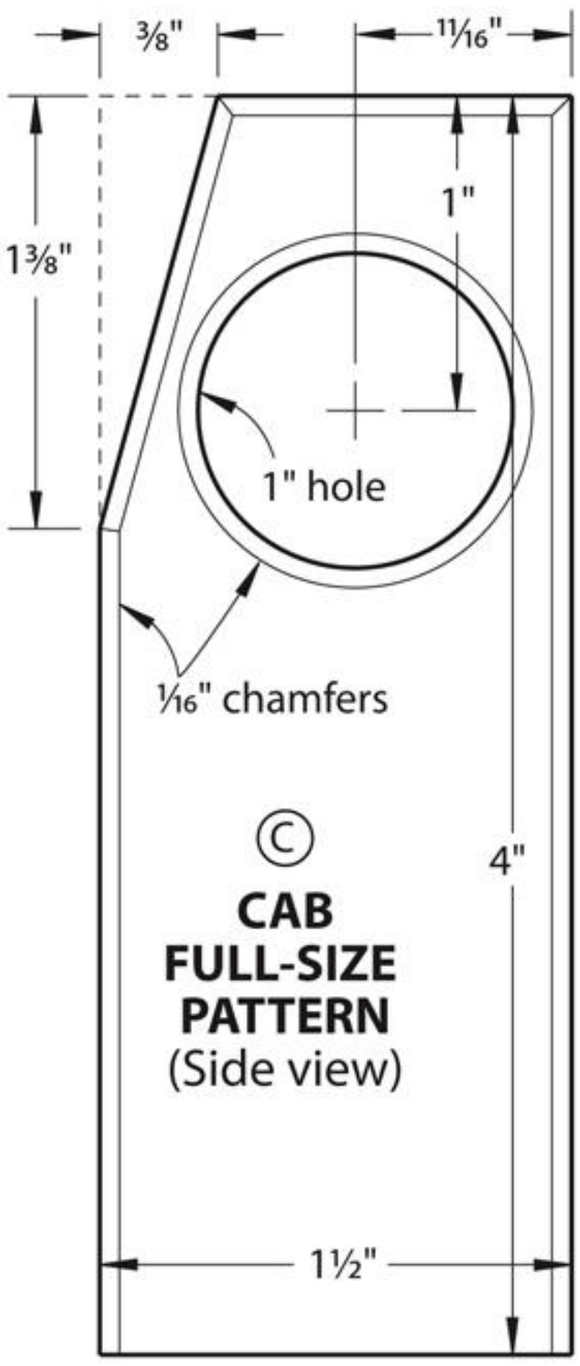


Potpourri Box
Page 36



HITCH
FULL-SIZE PATTERN
(Top view)



CAB
FULL-SIZE
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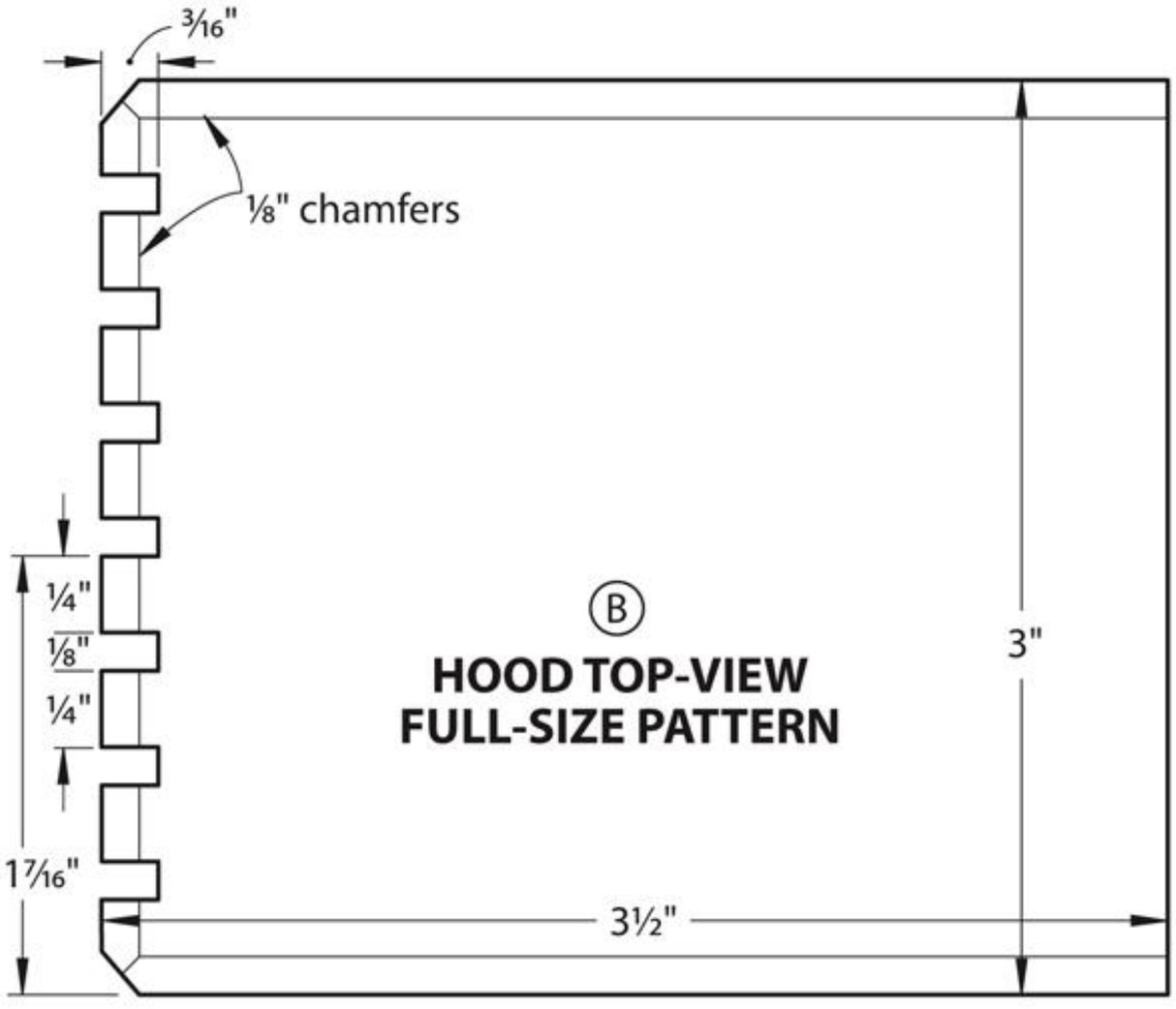
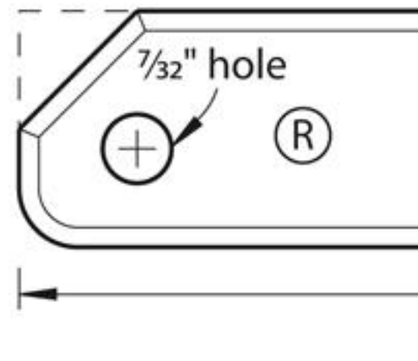
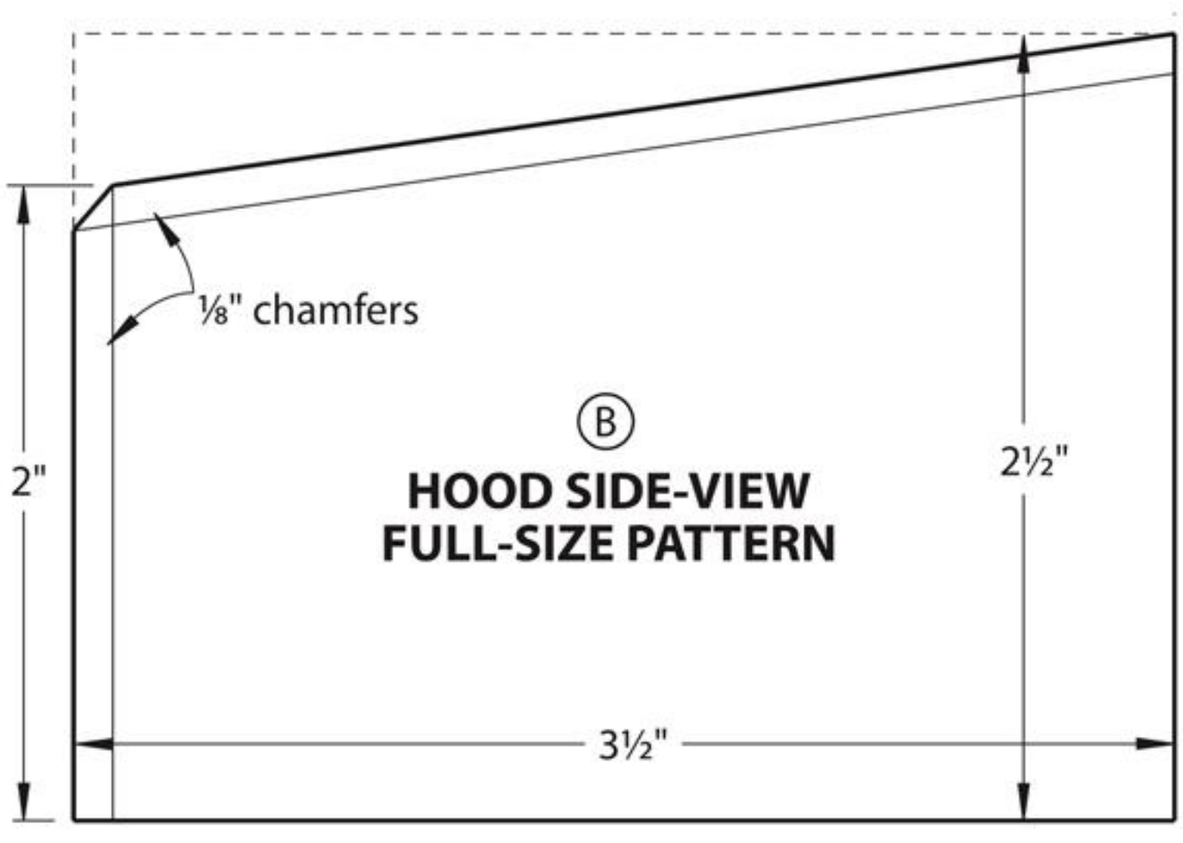
(Side view)

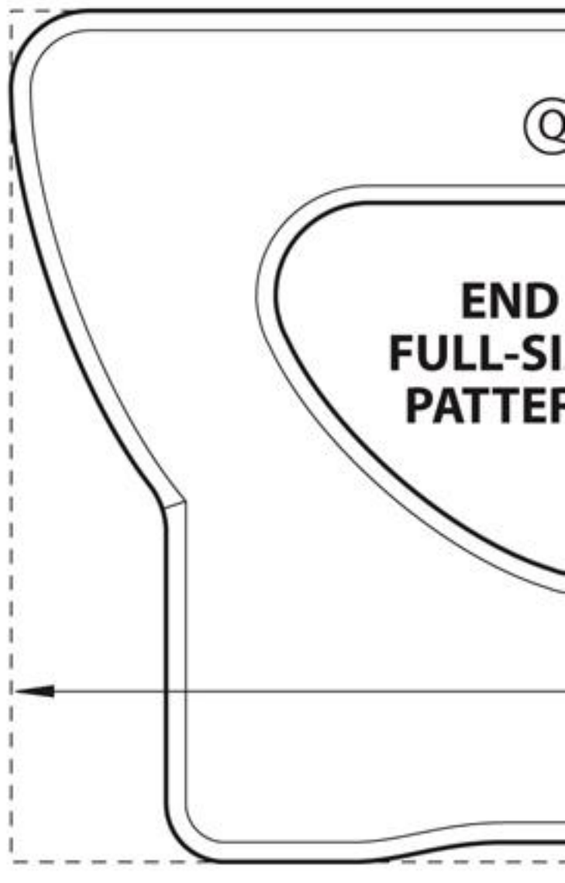


HOOD TOP-VIEW
FULL-SIZE PATTERN





HOOD SIDE-VIEW
FULL-SIZE PATTERN



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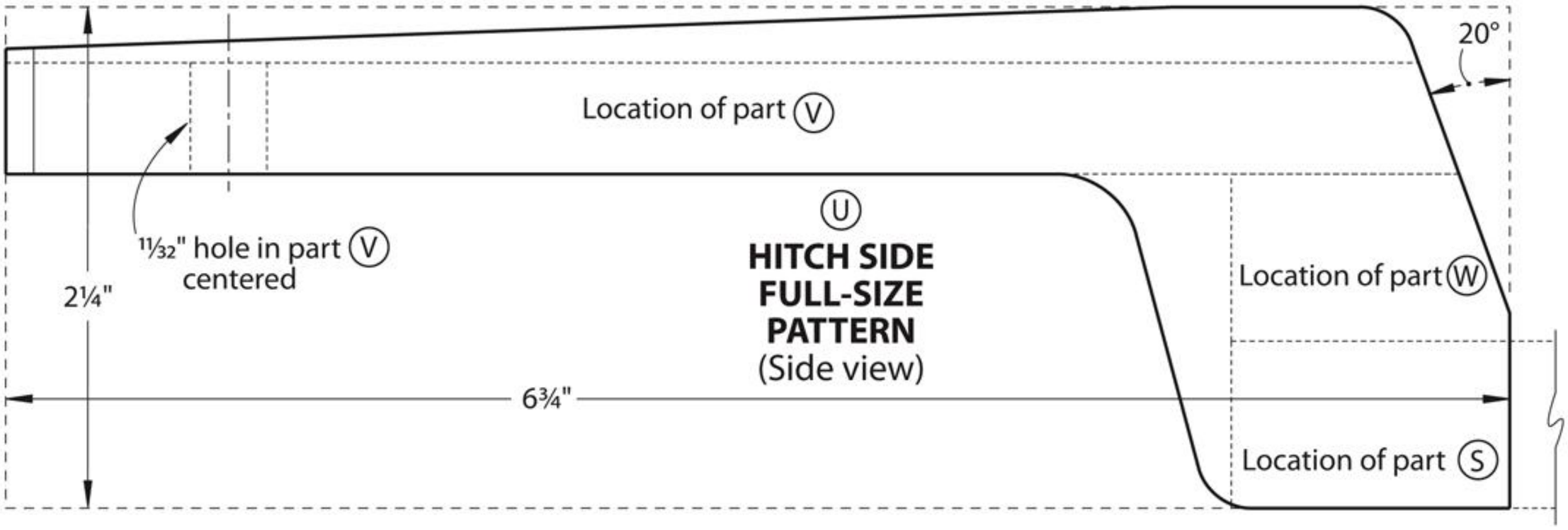
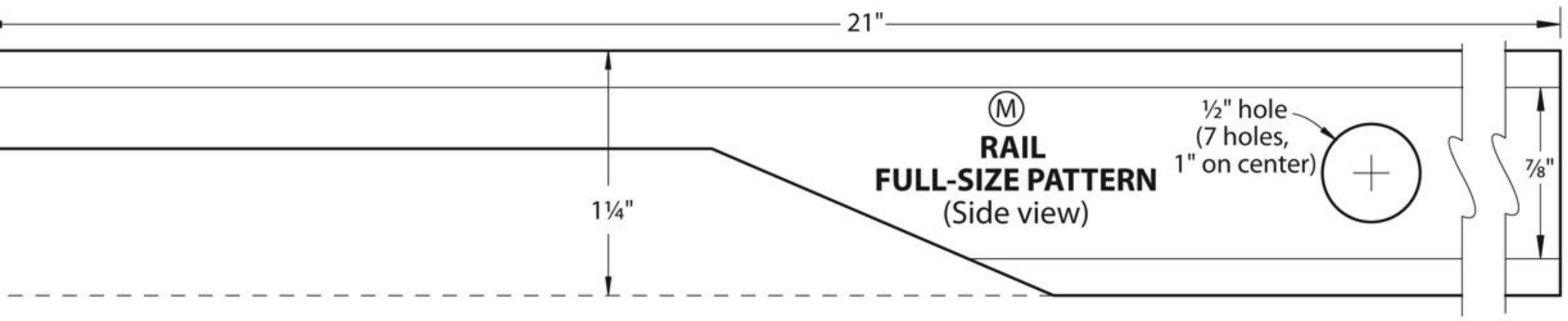
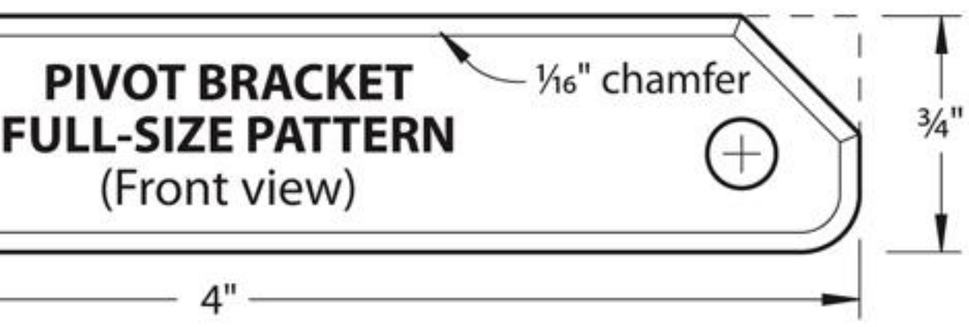
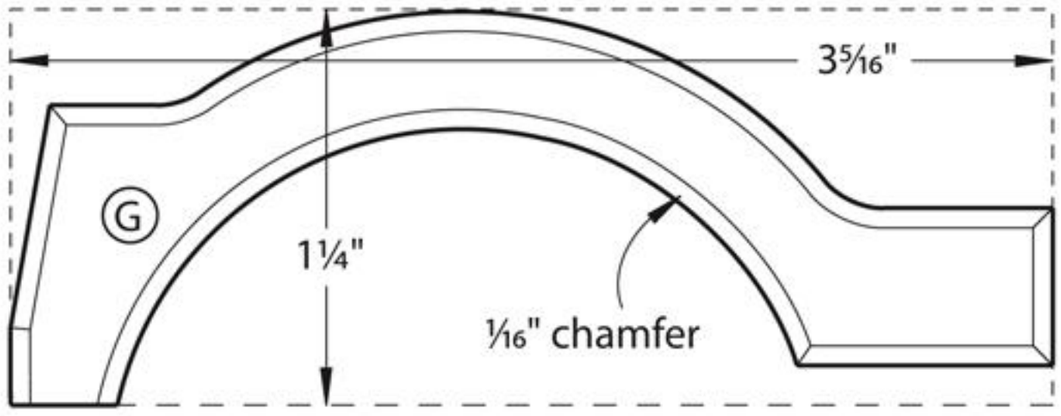
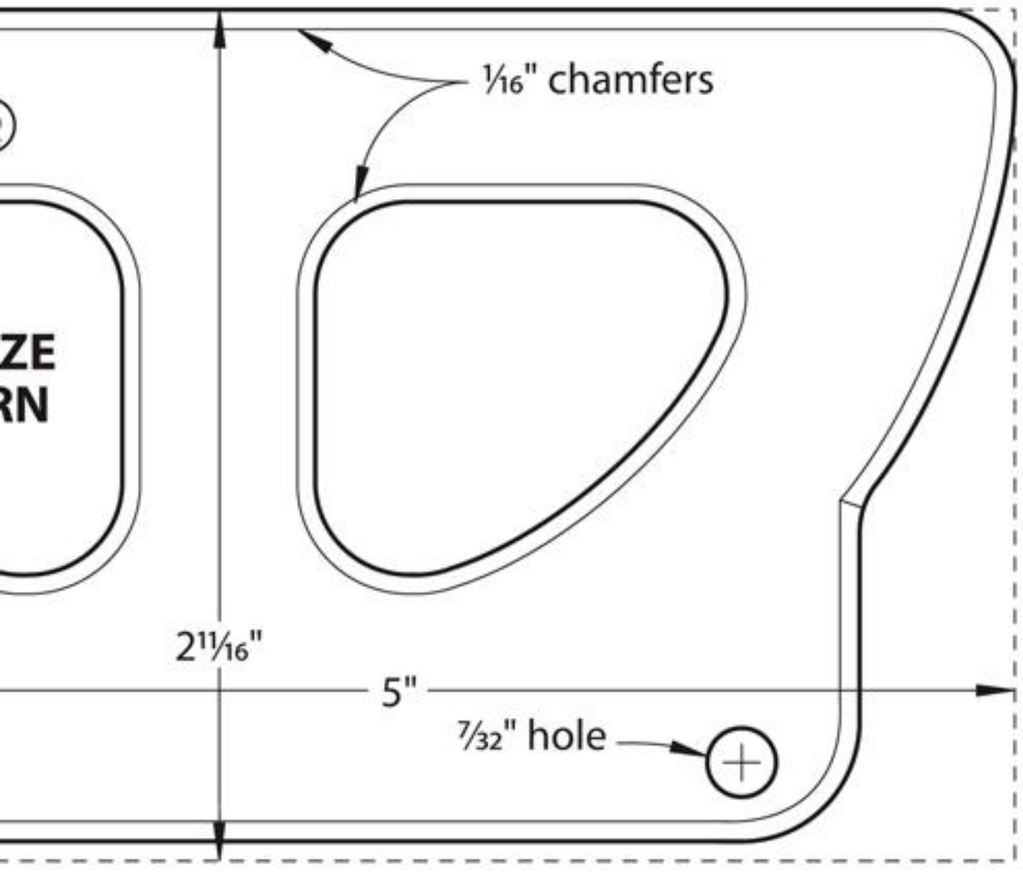


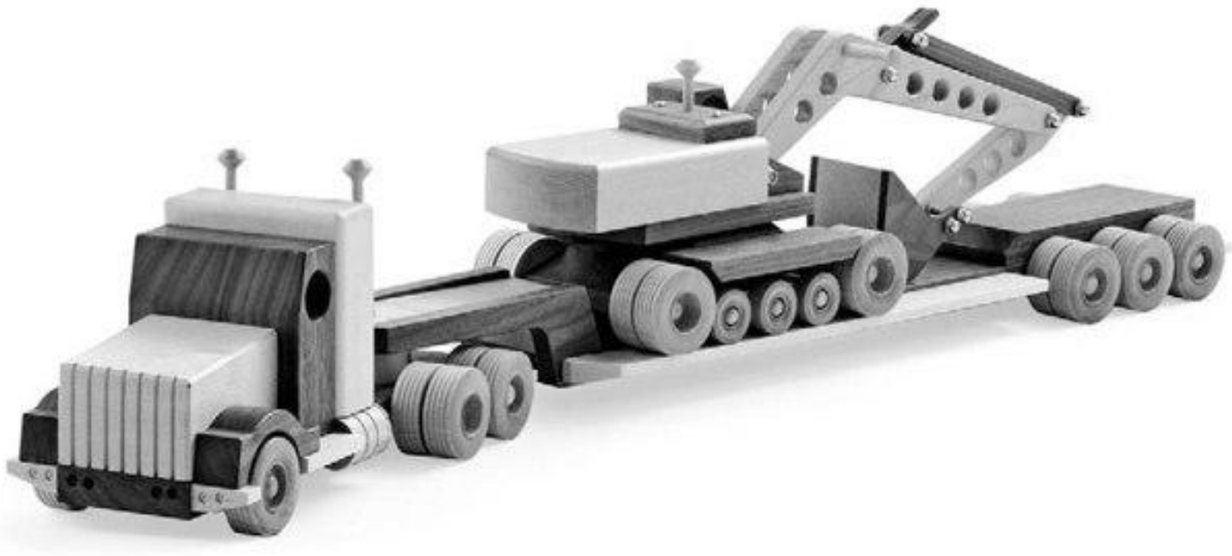


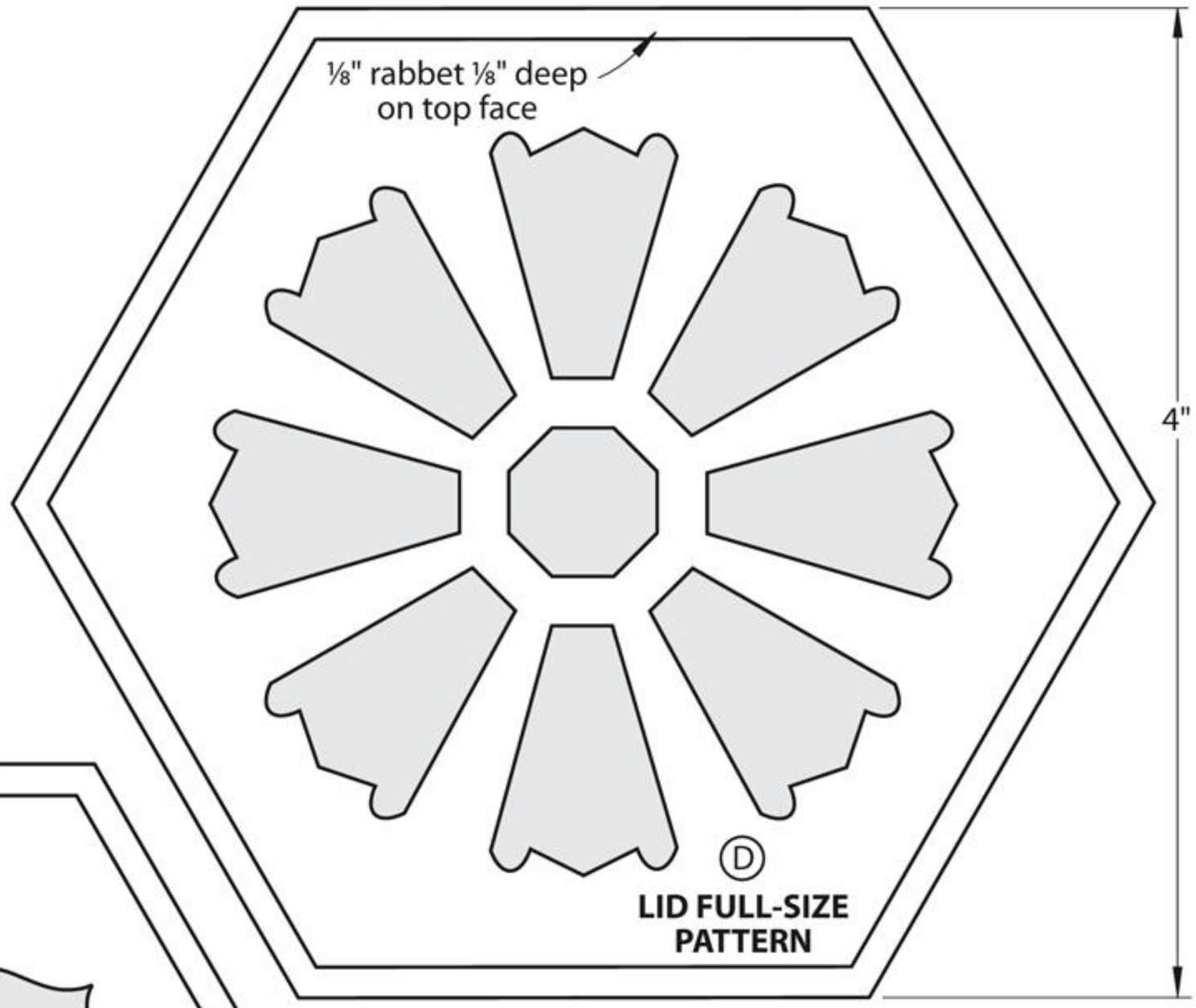


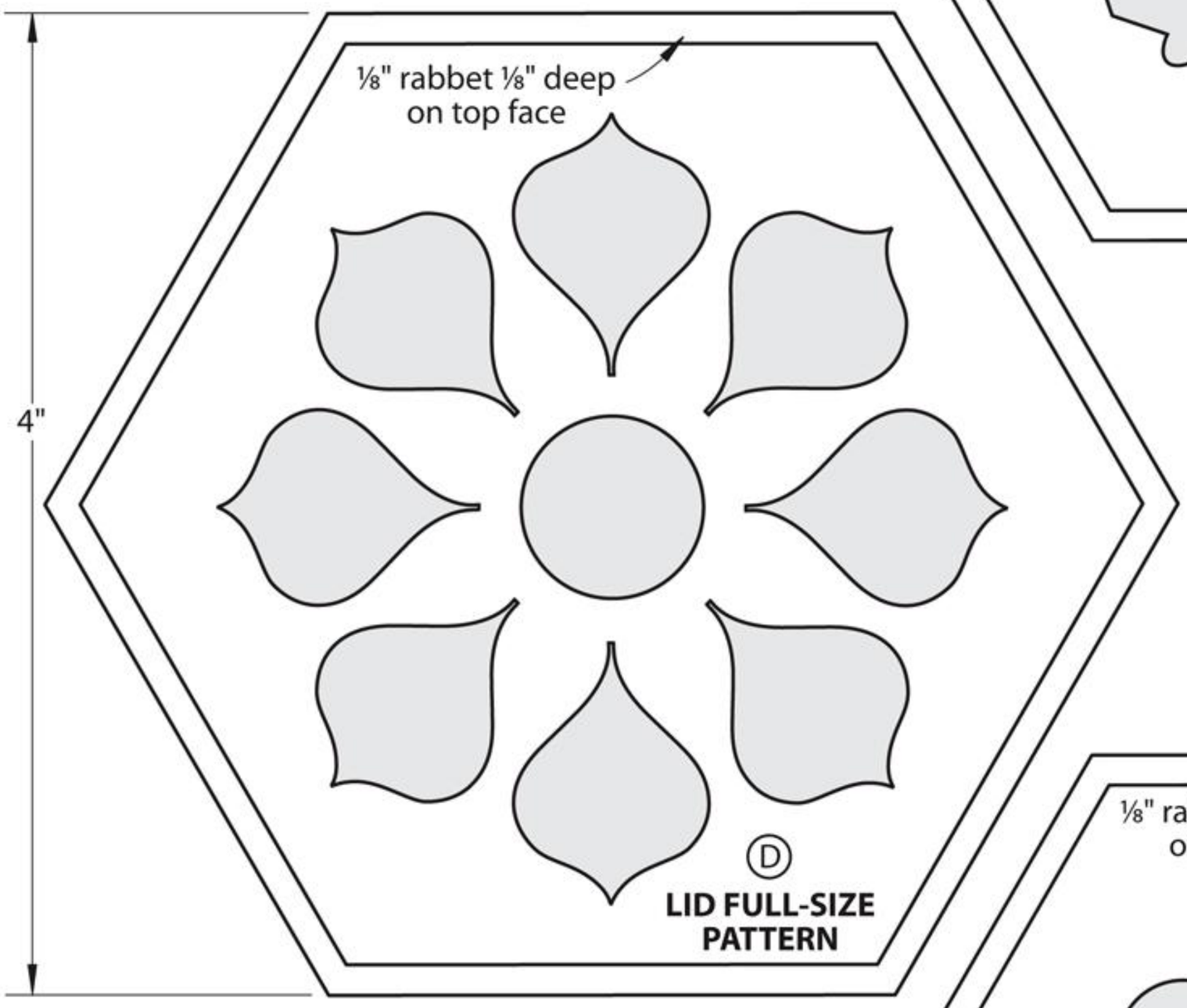


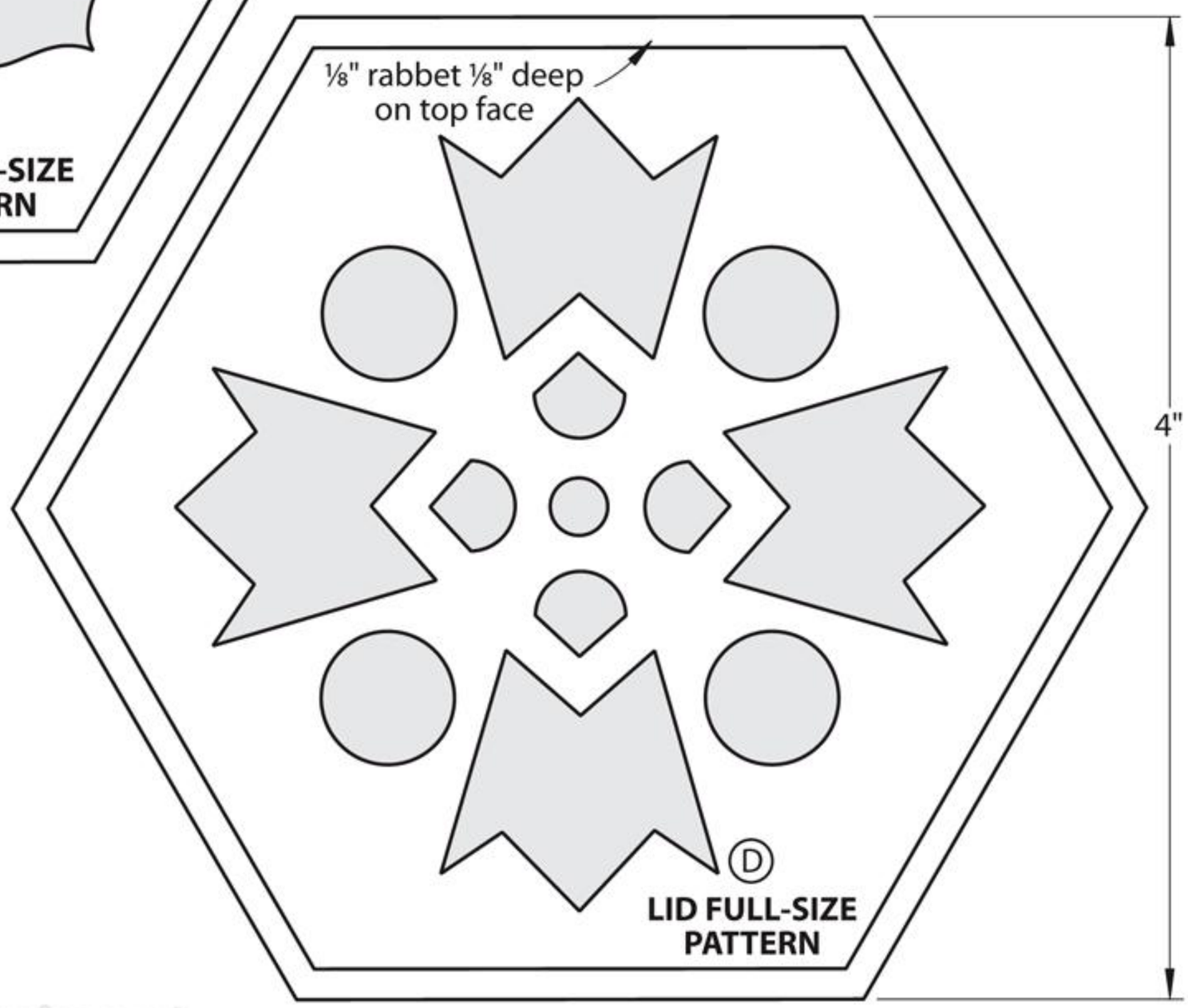


FENDER
FULL-SIZE PATTERN
(Side view)









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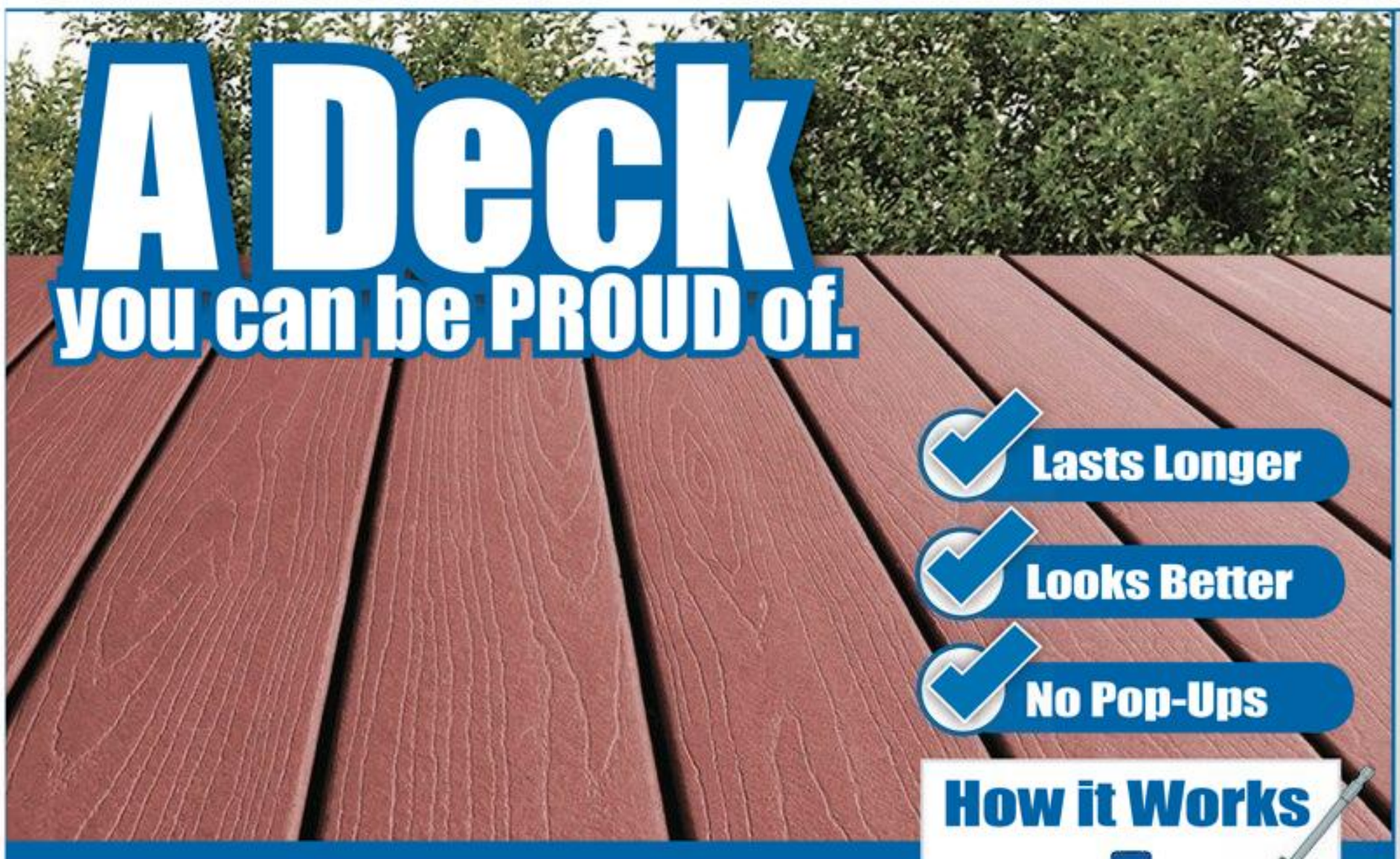

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12 Ways to Get the Best From Your Biscuit Joiner

For quick, reliable alignment and joining of project parts, nothing beats a biscuit joiner. At its most basic, you simply cut slots in mating pieces, add glue, insert a biscuit, and clamp. These 12 tips help your machine work harder.

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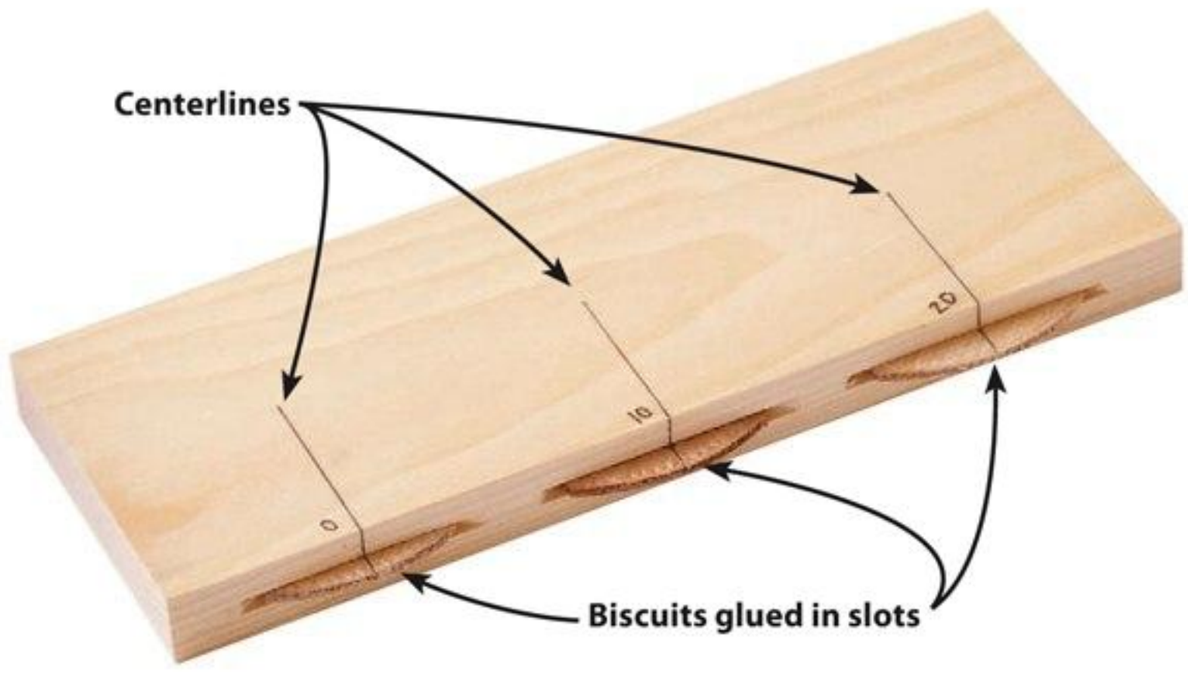
Tips for better biscuiting

1 Save time with a biscuit gauge

Wondering which size biscuit best suits your project parts? Make this simple gauge to show the width of #0, #10, or #20 biscuits and the slots that hold them. Simply mill a slot for each size, glue in a biscuit—making sure you push it in only halfway—and mark a centerline for each. Then line up the centerline on your gauge with the layout line on your workpiece for a quick reference on which to use. (Use the largest biscuit possible for maximum strength.)



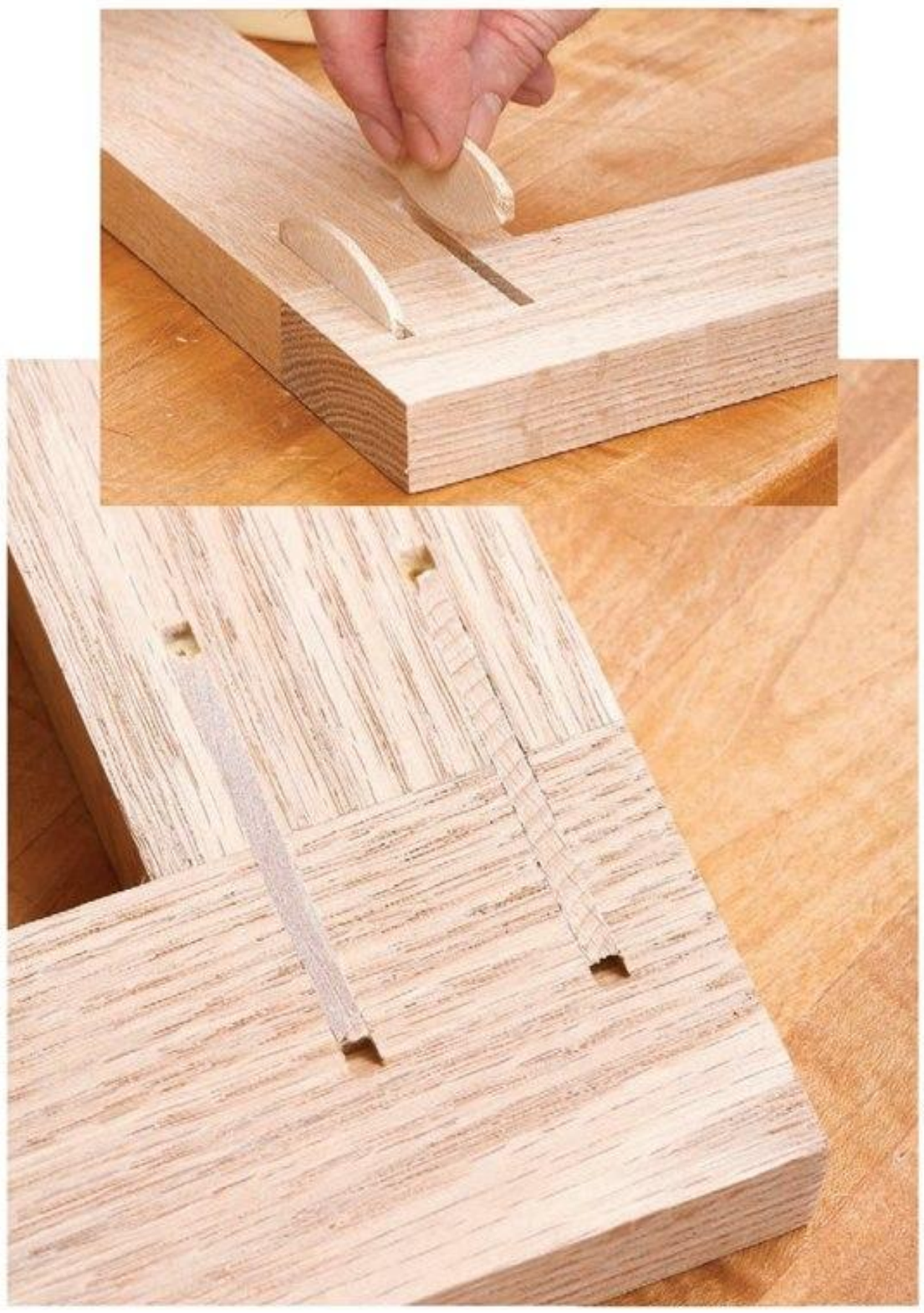
2 Trap bevel cuts even when your fence can't

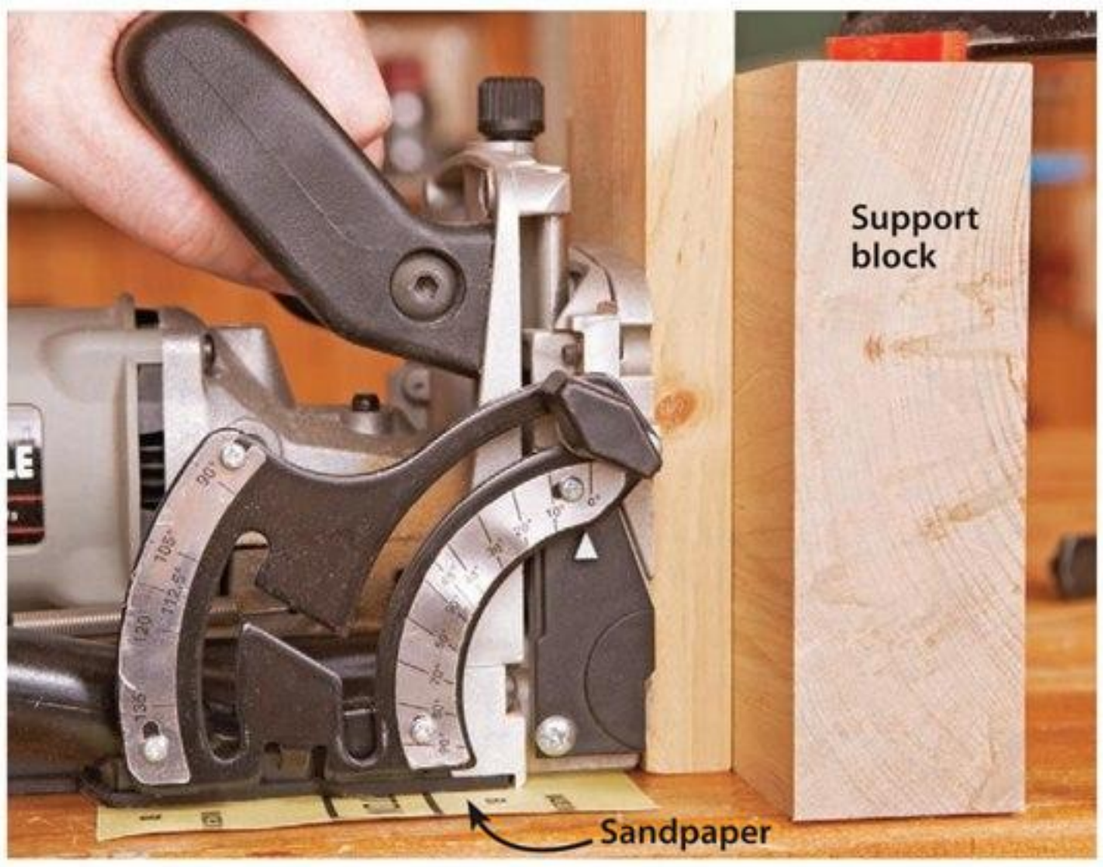
A few biscuit-joiner fences tilt to 135° to capture the end of a mitered workpiece. That keeps the tool stable when cutting the slot. If your joiner's fence maxes out at 90°, you can get the same stability with this trick. Simply clamp your mating mitered workpieces back-to-back so the bevels form a 90° angle, as shown at *left*, and cut slots on each miter.

3 Reinforce too-narrow joints with back-side biscuits

The slot for a #0 biscuit measures about 2⅛" wide, so you can't hide a biscuit joint in stock narrower than this. If you're making face frames—which are typically narrower than that—you won't be able to join them with any of the three standard biscuits. Here's a way to reinforce a joint with full-size biscuits on the back side—provided they won't be seen. Glue and clamp the mating boards together. When dry, cut slots across the joint line no deeper than ⅔ the boards' thickness, and then glue in biscuits (*inset*). After the glue dries, cut the biscuits off and sand them flush.

If you make a lot of narrow face frames, consider purchasing Porter-Cable's biscuit joiner, which includes an extra blade to cut smaller face-frame slots for special 1¼"-long biscuits.





4 Make perfect flush-fitting joints with a little lift

Even a well-tuned biscuit joiner can sometimes cut slots that result in a non-flush-fitting joint. To avoid this, elevate the biscuit joiner with a sheet of sandpaper before cutting the face-grain slot. Then, after assembly, use your router to flush-trim the end grain of that piece for a perfect flush fit.

These accessories help you make top-notch biscuit joints

◀5 Upgrade the blade

As with any cutting tool, a poor blade results in subpar cut quality. If you're seeing tear-out or hanging strands at the right-hand (exit) side of the slot, consider replacing the factory-supplied blade with a quality aftermarket one. We recommend Freud's six-tooth biscuit-joiner blade because its carbide teeth cut cleanly and last longer than the teeth on most stock blades.

Biscuit-joiner blade: #FI100, $20, Freud, 800-334-4107, freudtools.com.

6 Right-size your biscuits ▶

If you live in a humid climate, you know how biscuits can swell—sometimes even despite storing them in sealed containers—resulting in biscuits that won't fit in the slots. That's a problem when your glue begins to set up and you've got a lot of biscuits to install. Sure, you can shrink biscuits in a microwave oven, but they'll likely come out different thicknesses. So run your biscuits through the Biscuit Press, an aluminum hand-cranked tool that compresses them to uniform thickness.

Biscuit Press: $169, biscuit-press.com.

◀7 Add a third hand with this clamp

Referencing biscuit slots using the machine's base rather than the fence usually works great, provided your workpieces sit perfectly flat against the benchtop. Because it takes both hands to operate the joiner, you need a helping hand to secure the workpiece. Kreg's Bench Klamp System provides quick clamping, particularly with slightly bowed stock. To install this clamp, rout a recess into your benchtop and mount the flush-fitting plate with screws. When not in use, remove the clamp via the keyhole slot in the plate.

Bench Klamp System: #KKS-KBKSYS, $40, Kreg Tool Co., 800-447-8638, kregtool.com.

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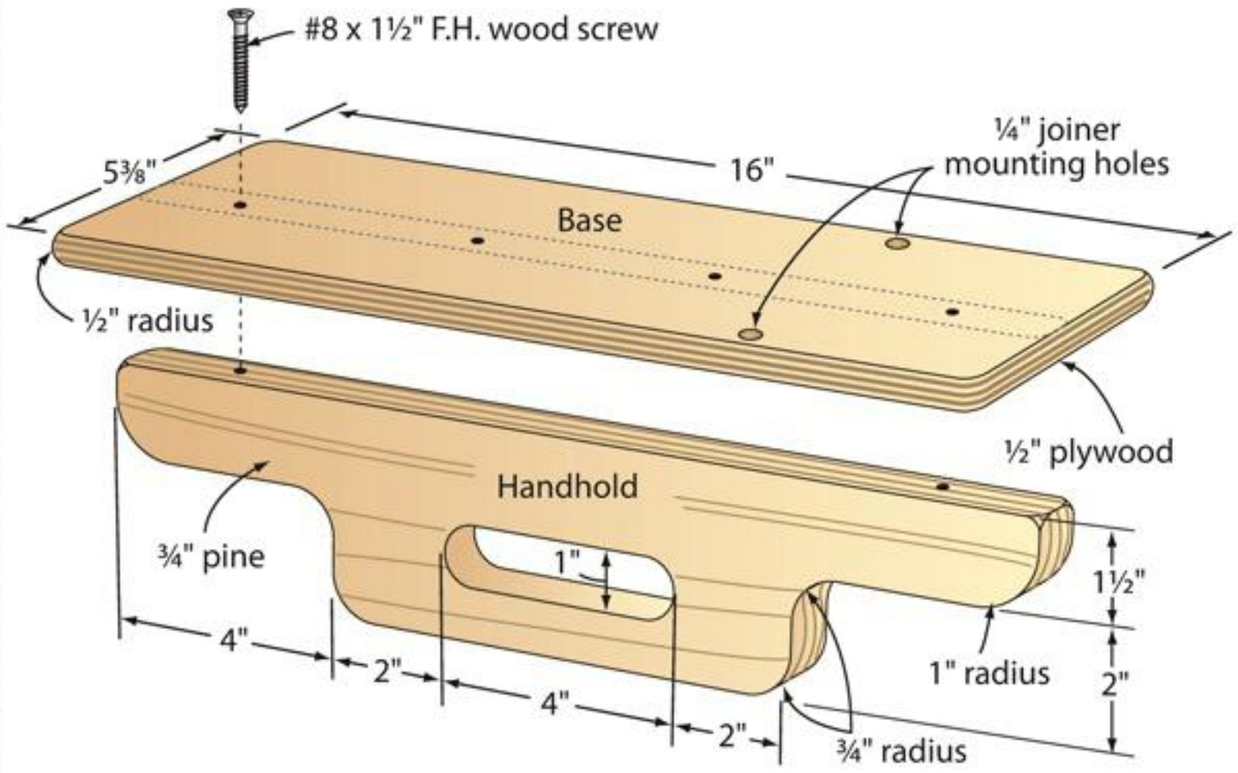
Shop-made jigs enhance your joiner's performance

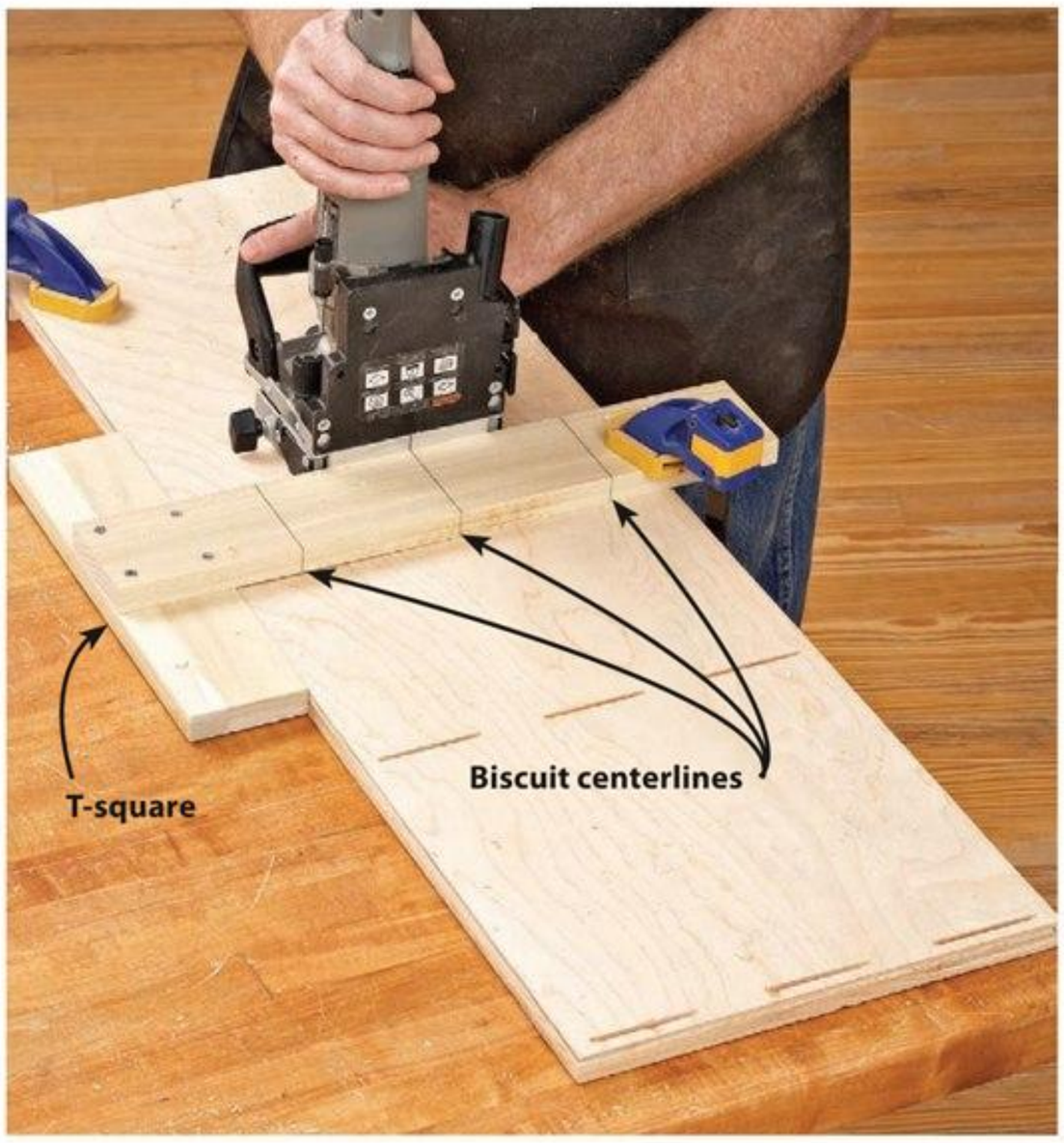


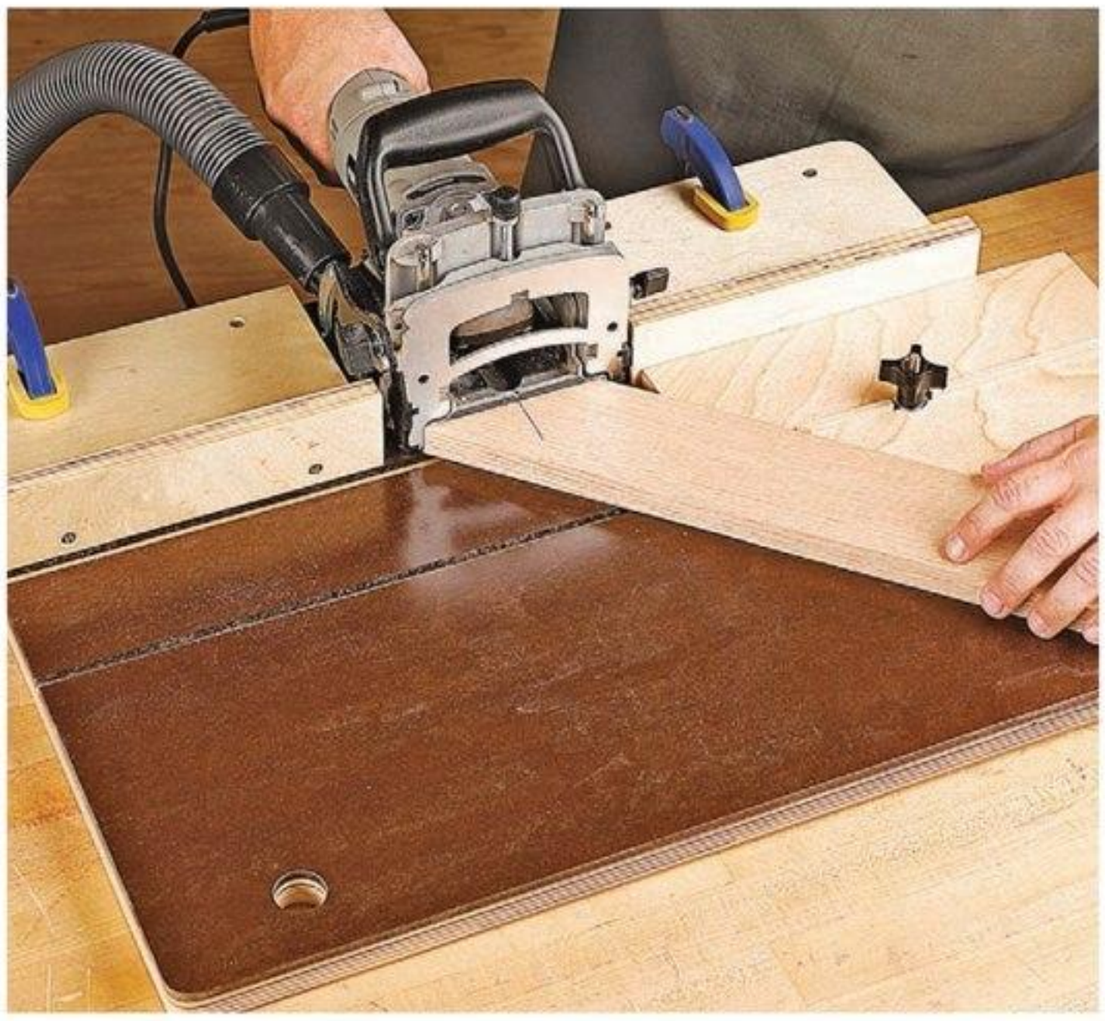
▲8 Add stability when you're on the edge

Sometimes, cutting slots into workpiece edges can be tricky because the short fence fails to provide enough reference surface to prevent tipping. That's when you need this base extension. Build it from plywood or any scrap stock that's flat.

9 Tee up a self-squaring story stick ▶

If you're cutting multiple biscuit slots in wide side panels, such as for shelves in a bookcase or cabinet, make a T-square for repeatable accuracy. Glue and screw the parts together at exactly 90°. After the glue dries, mark biscuit centerlines on the arm. Now use the T-square to line up your biscuit joiner for cutting slots in the case sides and mating shelves, referencing the T-square from the same edges.





◀10 Enjoy lots of options with this all-purpose biscuit jig

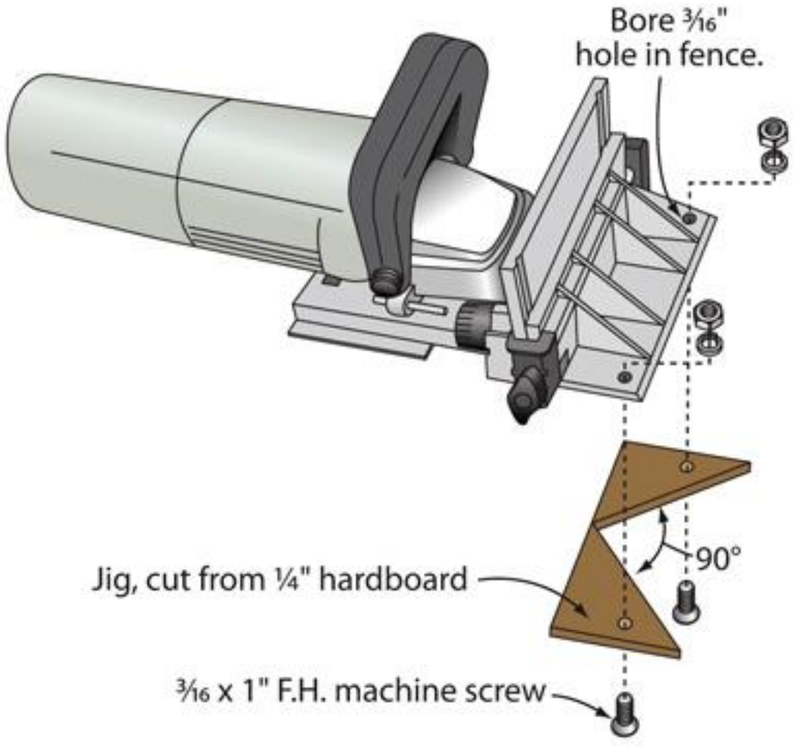
If you do a lot of biscuit joinery, you'll appreciate this versatile jig, with fences and guides that make cutting slots easy and accurate, including on beveled and mitered workpieces. Build it according to the plan in issue 161 (February/March 2005) or download it for free at woodmagazine.com/biscuitjig. Mount your biscuit joiner in the jig, clamp the jig to your workbench, and you have a rock-solid workstation.

Two biscuitless tricks for your joiner

11 Jazz up mitered corners with splines

Splines add both strength and visual appeal to normally weak miter joints, especially when you make the spline from a contrasting wood species. Cutting the spline slots on your tablesaw requires a tall jig, but you can cut them easily and quickly with your biscuit joiner and the attached fence jig, shown *below*.

Here's how to do it. First, assemble your mitered project and allow the glue to dry. Cut two mirror-image triangles, as shown, mounting them to your joiner's fence with machine screws and nuts. Set your joiner's cutting depth as deep as you can. Trap the mitered corner in the fence jig and plunge a cut centered on the workpiece's thickness. Then glue in the spline of your choice. When dry, trim it and sand flush.



12 Mount a tabletop... with your biscuit joiner

To use "Z-clip" fasteners to secure tops to tables, desks, and dressers, you typically saw a blade kerf along the rails or aprons. To avoid any potential weakening that might result from the full-length kerf, use your biscuit joiner to cut slots where the fasteners will mount. Set the joiner for the No. 10 depth slot, adjust the fence to cut the proper distance from the top of the rail (usually ½"), and plunge the blade. You can do this before or after assembly.

Produced by **Bob Hunter** with **Kevin Boyle** and **Matt Seiler**

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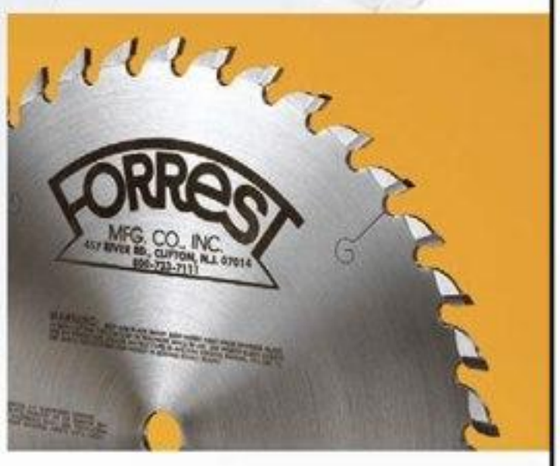

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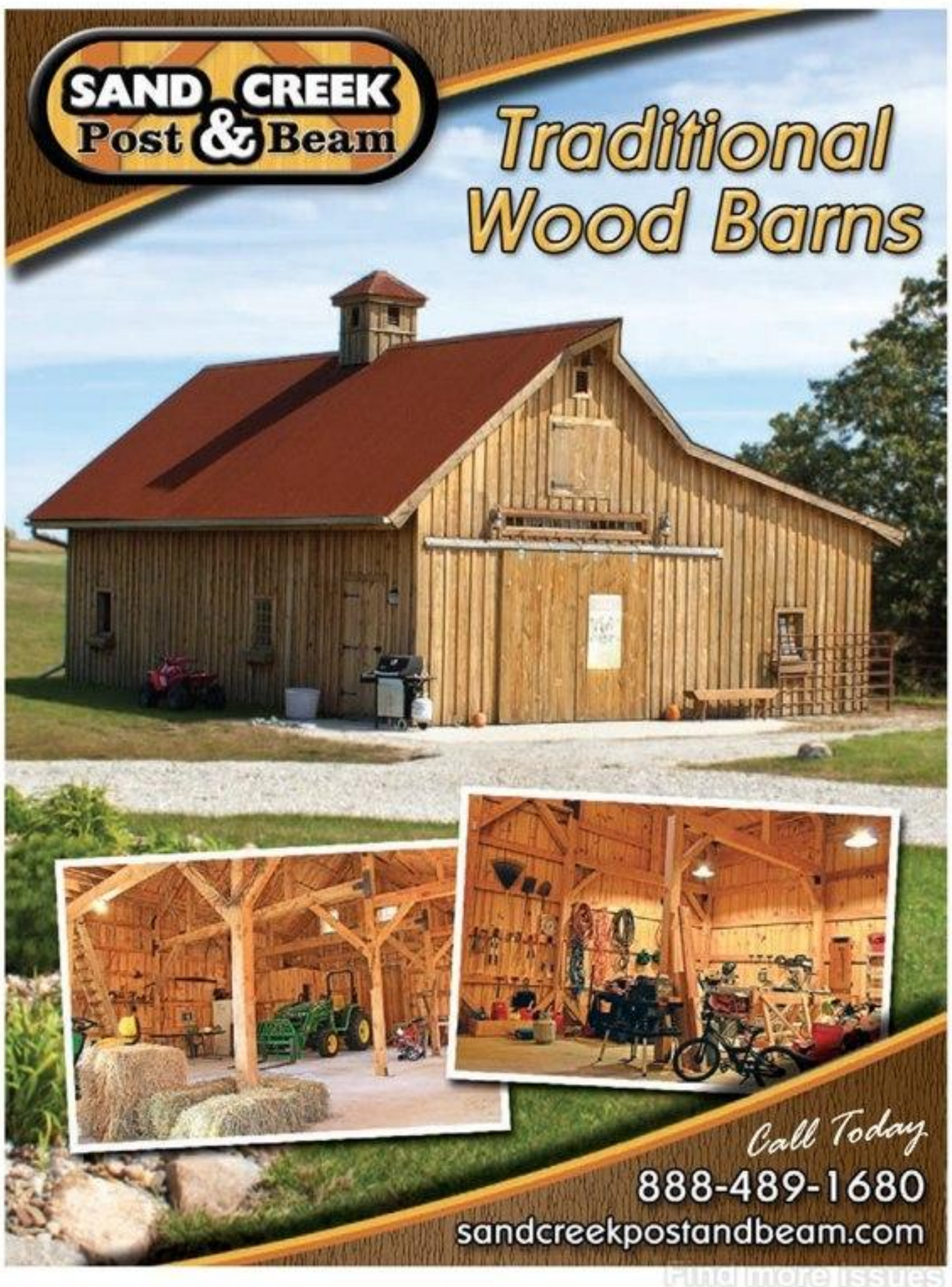

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The Art of Framing Art

You've made the frame, now showcase your artwork with the right combination of glass, mats, and backers.

There's more to picture framing than cutting clean miters and rabbets. What kind of mats and glass should you use? How do you get everything to fit properly? In this article professional picture framer Stuart Altschuler will share with you the start-to-finish steps and some tips that spell the difference between average and special framed artwork. In no time, you'll be as comfortable showcasing your art as making the frame parts.

Take the "blink test"

First, think in terms of presenting the art, not simply framing it. Good framing design passes what I call the "blink test." Stand in front of a framed piece of artwork on a wall and close your eyes. When you blink them open, your eyes should focus first on the artwork, not the mat or the frame. Over the years, I have developed a set of guidelines that will help your framed artwork pass the blink test:

- Go conservative, not flashy, with the style of the frame and color of the mat. Make the artwork stand out as the most important element.
- Match the style of the frame to the style of the artwork. Use fun frames for fun artwork or photos and formal frames for serious pieces.
- With few exceptions, I like to keep the wooden frame parts narrower than my mat margins. It helps keep everything in proportion.
- When choosing a mat board color, choose one that won't compete with your artwork. Use a neutral color, such as white or off-white, to blend with the artwork.
- If you want to stack two mats to create an accent, use white or another neutral color for the front mat and a brighter accent color for the back mat [**Photo A**]. For example, if you are framing a photograph of a sailboat with a red stripe in the sail, use a cool off-white as your top mat to complement the cool tone of the blue water. Then add a red lower mat to match the stripe in the sail.

DOUBLE MAT ADDS SUBTLE COLOR

Make the opening in the front mat about ½" larger than the opening in the back mat. This will allow ¼" of color to show all around.

FIGURING YOUR MAT AND FRAME SIZES

To use the "**Figuring Your Mat and Frame Sizes**" chart, *below*, first plug these measurements into the column on the right:

Width of your unmatted artwork = **A**
Height of your unmatted artwork = **B**
Width of your mat margins (from the "Determining Mat Margins" chart) = **E**
Width of rabbet in frame stock = **H**
Width of the frame stock = **I**

Then perform the calculations in the middle column and write the results in the right column. (**Note:** The gray boxes show examples of calculations.)

Figuring Your Mat and Frame Sizes

Your Measurement	Calculation	Your Final Dimension
Width of Artwork	Measure width of artwork *(Example) 8″*	**A =**
Height of Artwork	Measure height of artwork *10″*	**B =**
Width of Mat Window	**A** ____ – ¼" *8″ – ¼" = 7¾″*	**C*=**
Height of Mat Window	**B** ____ – ¼" *10″ – ¼" = 9¾″*	**D*=**
Mat Margin Width	(See "Determining Mat Margins" at top right) *2″*	**E =**
Width of Mat	**C** ____ + (2 × **E** ____) *7¾″ + (2 x 2″) = 11¾″*	**F =**
Height of Mat	**D** ____ + (2 × **E** ____) *9¾″ + (2 x 2″) = 13¾″*	**G =**
Width of Rabbet	Measure rabbet in frame stock *¼″*	**H =**
Width of Frame Stock	Measure width of frame stock *2″*	**I =**
Short Length of Rails	**F** ____ + ⅛" – (2 × **H** ____) *11¾″ + ⅛" – (2 x ¼″) = 11⅜″*	**J =**
Short Length of Stiles	**G** ____ + ⅛" – (2 × **H** ____) *13¾″ + ⅛" – (2 x ¼″) = 13⅜″*	**K =**
Long Length of Rails	**J** ____ + (2 × **I** ____) *11⅜″ + (2 x 2″) = 15⅜″*	**L =**
Long Length of Stiles	**K** ____ + (2 × **I** ____) *13⅜″ + (2 x 2″) = 17⅜″*	**M =**

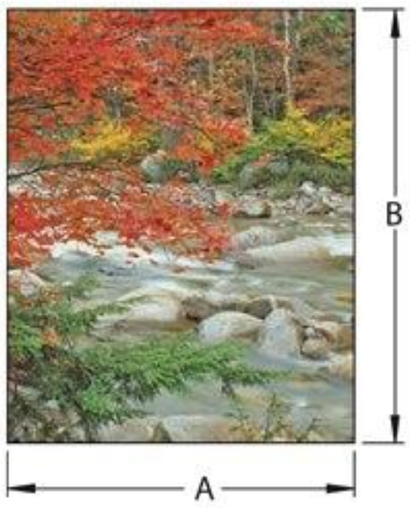
*For a double mat, make the window opening in the front mat ½" larger in width and height.

Determining Mat Margins*

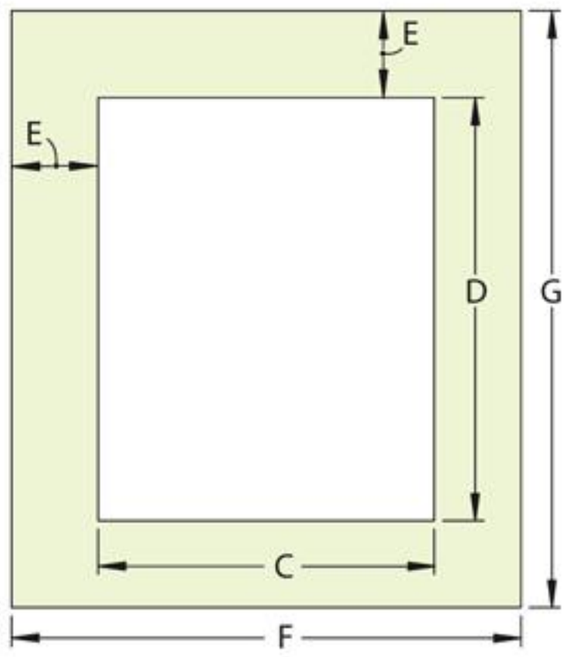
Artwork Size	Mat Margin Width
12×16" or less	2"
16×20"	2½"
20×24"	3"
more than 20×24"	3" or more

*Cut mat margin width in proportion to the overall size of the artwork.

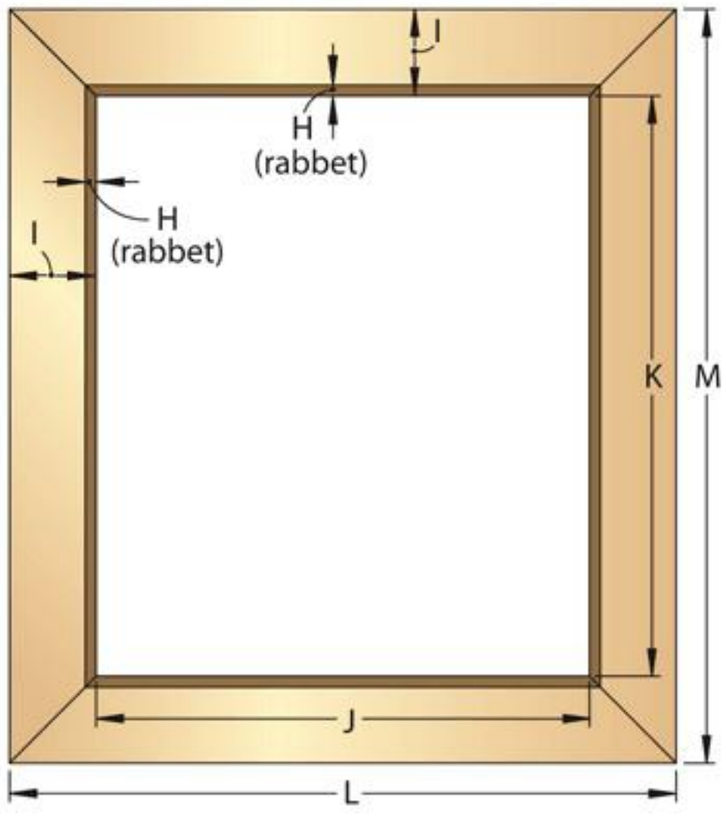
ARTWORK



WINDOW MAT



FRAME (Back view)



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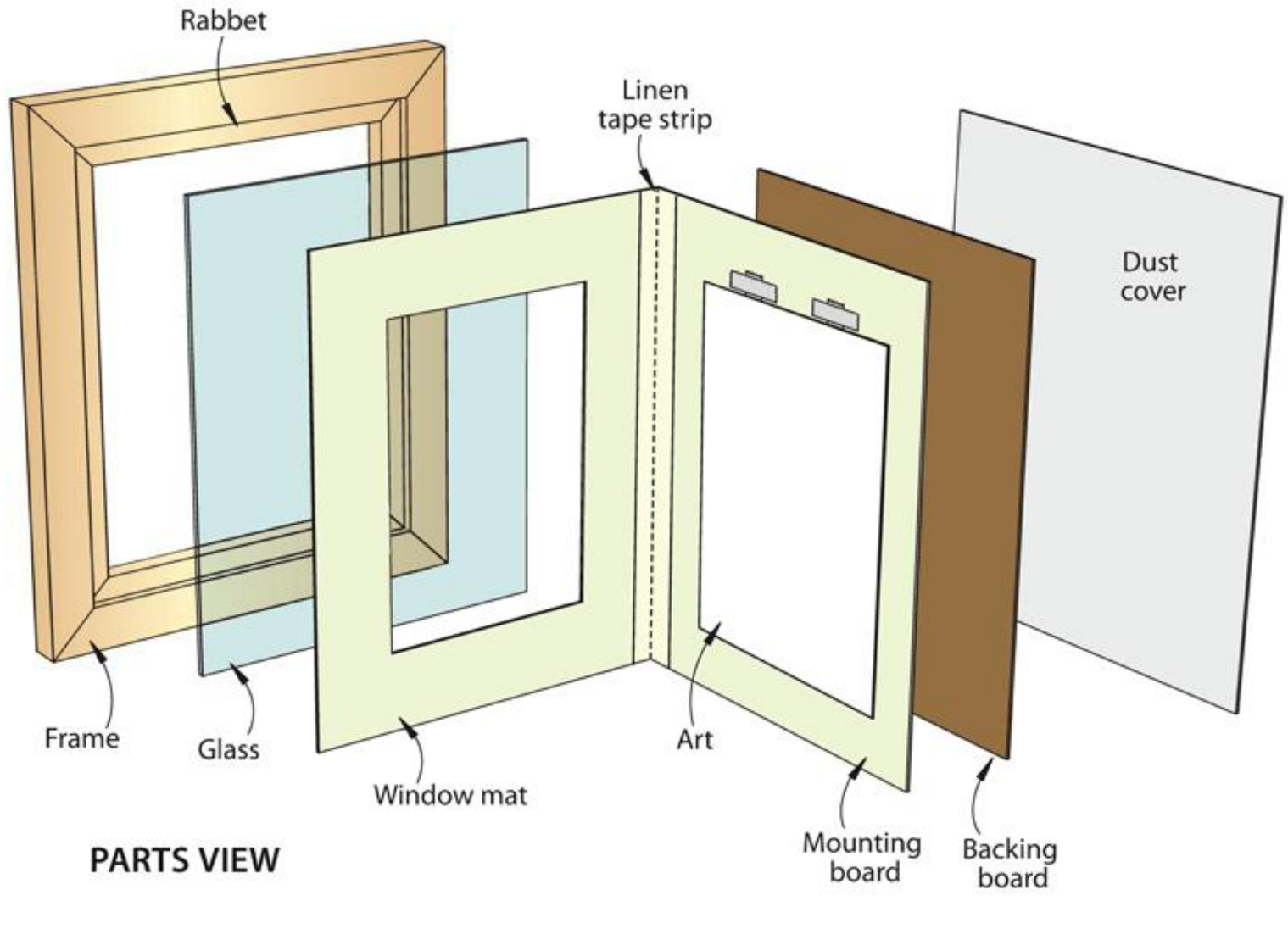
Start with the art

Determine your mat and overall frame sizes by measuring your artwork and working "out" from there. Use the "Figuring Your Mat and Frame Sizes" chart on the opposite page to help with the math. Don't worry, it's not that difficult. Just plug in the size of the artwork and the width of the frame stock and rabbet, and all of the other measurements fall easily into place.

Use these dimensions and the mat margin to find the size of the mat, glass, mounting board, and backing board. (See **Parts View** at *right*.)

Once you know the mat size, what about the length of the frame pieces? What you're really trying to determine is the distance between the *rabbets* on the back of the frame. But if you cut the frame so the mat fits the rabbets *exactly*, the glass and mats may be just a smidgen too tight to fit into your frame. I like to add ⅛" to the distance between the rabbets to allow the parts to float with ⅟₁₆" space all around. This also allows some room if the frame should expand with a change in humidity. The chart takes this into account.



PARTS VIEW

Time to cut a few corners

With all the measurements in hand, you can now cut your frame pieces. The type of saw you use to cut frame miters doesn't matter so much as how well it cuts a perfect 45° corner and leaves a clean edge. To cut parts of equal length, you'll also want a saw that you can equip with a stopblock. When cutting miters by hand with a miter box, ensure clean cuts by using a 20-tpi (teeth per inch) handsaw. For the cleanest cuts on a tablesaw or mitersaw, use an 80-tooth crosscut blade.

The best way I've found to assemble a frame is to use a miter vise [**Photo B**]; see **Sources** on *page 59*. With this vise, you join each corner separately and reinforce the joint with wire brads. (For more on cutting and reinforcing miter joints, see **More Resources** on *page 59*.)

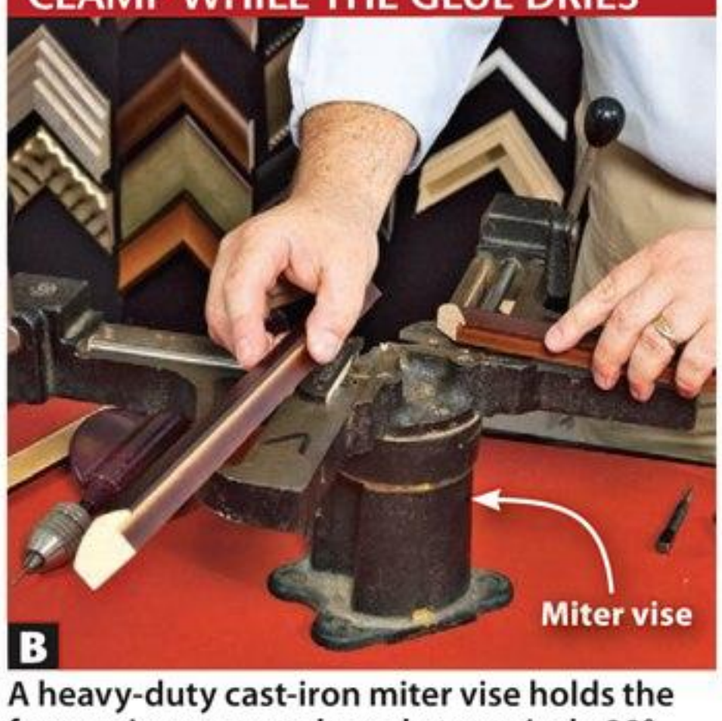
To assemble each corner, first dry-assemble two adjacent frame pieces to check that the corner matches well. If I have a complicated profile on the front face of the frame, I try to match the front faces. Tighten the vise jaws and check your fit. If acceptable, loosen one jaw, slide out the frame piece and apply glue. Replace that piece and tighten the jaw just enough to prevent the frame pieces from moving when you fasten them together.

Drill a pilot hole along one edge of the frame piece where it intersects the mating frame piece and won't interrupt the profile. For greater control, I like to use a small hand drill [**Photo C**]. Then fasten the corner using a #16 wire brad long enough to join the miter [**Photo D**]. I fill the brad holes with Briwax Touch Up Sticks (see **Sources** on *page 59*).

Some framers add a single nail to the opposite side of each corner. This optional method, called cross-nailing, reinforces the joint but makes it nearly impossible to separate the parts if you have a problem.

With the corner glued and nailed together, remove the assembly from the vise and let it dry. Then repeat the process with the remaining two parts. ***Quick Tip! Assemble the second set the same as the first.*** Place the short and long frame parts into the vise in the same orientation as the first pair of parts or you won't end up with a rectangular frame.

CLAMP WHILE THE GLUE DRIES



A heavy-duty cast-iron miter vise holds the frame pieces securely and at precisely 90° while the glue dries.

DRILL THE PILOT HOLES AND DRIVE IN THE BRADS FOR SOLID CORNERS

Bore a ⅟₁₆" pilot hole in one side of the frame for a brad. (Note: For strength, nail in through the vertical sides, not the top or bottom of the frame.) Drive the brad and set it just below the surface of the wood. Repeat the process with a second brad in the same corner.

MARK THE CORNERS OF THE WINDOW MAT

Using a sharp pencil, lay out crosshairs at each corner to indicate the corners of the window opening.

CREATE A "BOOK" THAT OPENS FOR ADJUSTMENTS

Join the window mat (or mats) edge to edge to the mounting board with tape. This technique allows you to reposition the art inside.

Finally, join the two subassemblies, applying glue to both remaining corners at the same time so you don't have to pry open the last corner to apply glue. Then clamp and nail each of the remaining corners.

Cut and assemble the package

Professionals call the items that fit inside the frame a "package." From front to back, this includes the glass, the window mat(s), the artwork, a mounting board, and finally a backing board [**Parts View** on *page 57*].

Using the dimensions figured earlier, cut the mats, a mounting board, and a backing board using a utility knife with a sharp blade and a straightedge. The mounting board and backing board can be made of extra pieces of mat board or foam board. (All can be found at art supply shops.)

After cutting the boards to size, cut the opening, or bevel-sided "window," in the mat. If you'll only ever make one frame, have a local picture framer cut the mat for you. But, if you plan to frame more than a few pictures, invest in a hobby-quality mat cutter [**Sources**]. Handheld mat cutters can be found for $30–$40. Or step up to one that includes straightedges and stops for $125–$150. Professional versions like the one I use (and shown in the photos here) cost $900 and up. They offer greater cutter control and will accept large mats. A pro will charge you around $20 to cut a mat, so a mat cutter pays for itself quickly.

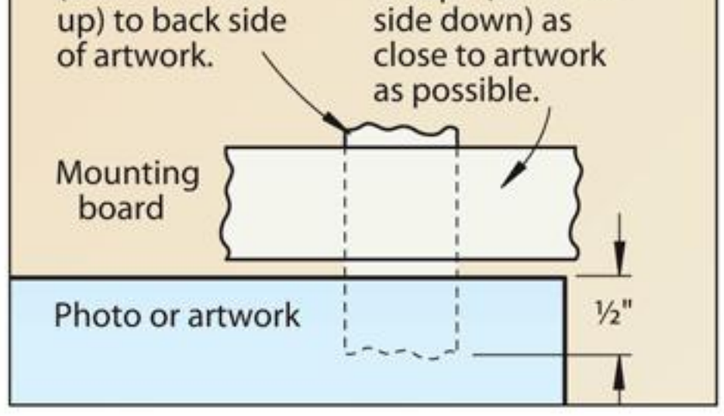
To start, turn the mat face down and mark the four corners of the window [**Photo E**]. Then cut the mat. ***Quick Tip! Eliminate unsightly overcuts.*** When cutting the window, start and stop the cut a hair short of the cross hairs and finish the cut freehand.

For a double mat, cut the front mat with a ½" larger window. Then adhere the two mats securely together with double-sided tape. Next, join the window mat(s) to the mounting board to create a hinged "book" [**Photo F**].

There are two ways to secure the artwork to a mounting board. To preserve an important piece of art, use a process called Japanese hinging as shown in the drawing at *right*. Museums prefer this method because it can be undone without affecting the artwork. (The pros use acid-free 100% cotton paper and starch-paste adhesive from art supply stores.)

For a quicker method to secure less-valuable artwork, attach a strip of 1"-wide acid-free tape along the top edge of the back of the art leaving half exposed. Then center the mat over the art and press them together. No matter which method you use, the final step is to add the backing board behind the mounting board.

JAPANESE HINGING


Step 1
Adhere tape (adhesive side up) to back side of artwork.
Step 2
Place 2" strip of tape (adhesive side down) as close to artwork as possible.
Mounting board
Photo or artwork
½"

Protect it with glass, or not

Most frames include glass to protect the artwork from dirt and damaging UV light. As a rule of thumb, use glass over works of art on paper (drawings, watercolors, and photographs) but not over paintings and other works of art on canvas. Textiles, needle art, or other fabrics require further thought: Skip the glass

Making a clean, straight cut in glass

Cutting glass in your own shop saves money and time. To start, you'll need a glass cutter (about $5 at hardware stores or home centers) and mineral spirits. You'll also need a straightedge (such as a metal ruler), glass cleaner, two spring clamps, and eye protection.

First, clean the glass. Next, place it on a flat, clean, cushioned surface, and clamp the ruler to the glass where you want to score it for the cut. Now follow the steps *below*.

Clamp a straightedge to the glass and brush on mineral spirits. To make a score line, draw the cutter firmly and steadily from one end to the other.

Turn the glass over and with the cutter handle down, use it to tap edge to edge on the visible score line. The glass will separate cleanly as you move along.

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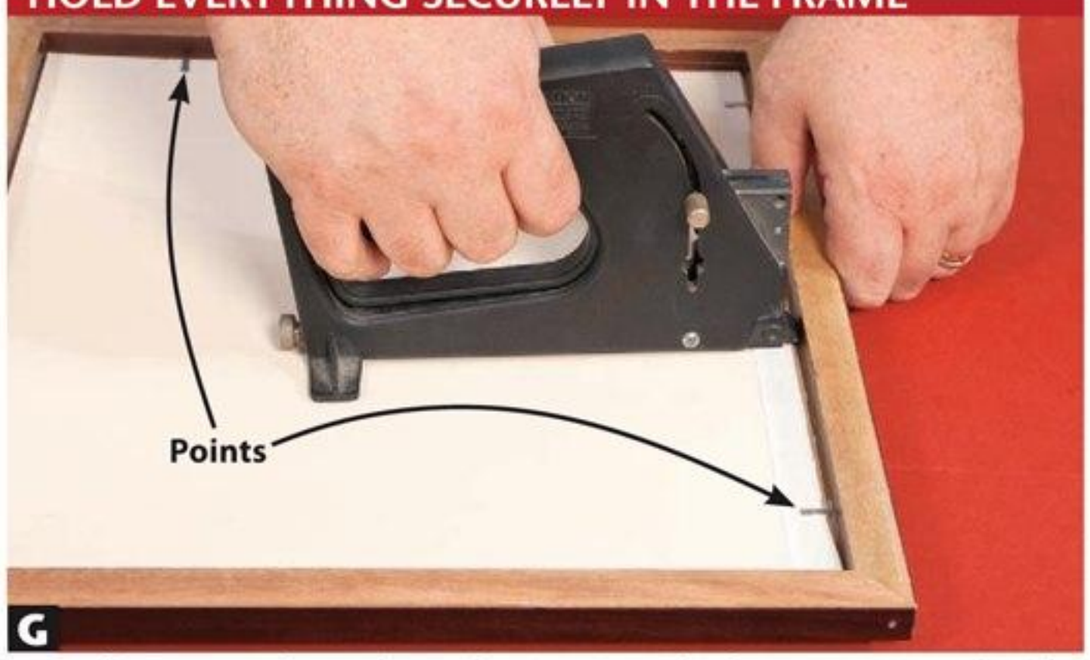
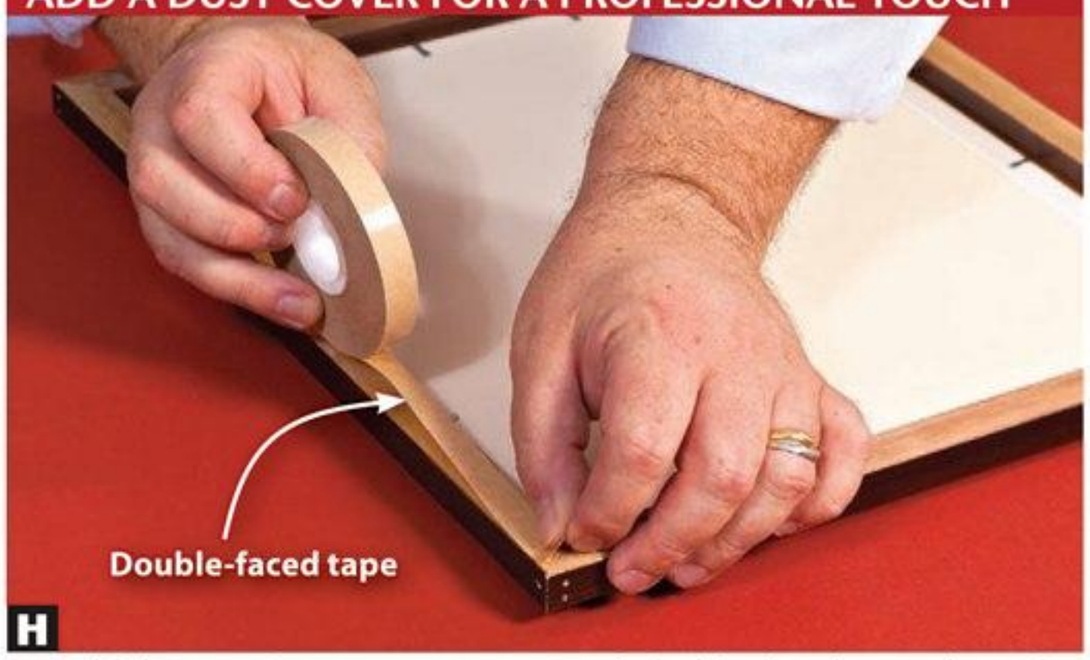
HOLD EVERYTHING SECURELY IN THE FRAME



Drive flat, arrow-shaped metal points into the frame every 3–4" with a professional point driver.

ADD A DUST COVER FOR A PROFESSIONAL TOUCH



To hold down a dust cover, run a strip of double-faced tape along the back edges of the frame. Then, adhere Kraft paper to the tape.

TRIM OFF THE EXCESS FOR A CLEAN APPEARANCE

Use a utility knife or razor blade to carefully trim the dust cover flush with the back edge of the frame.

HANG IT UP WITH STURDY HANGERS AND WIRE

Mount frame hangers about ¼ to ⅓ of the way down from the top and string braided picture frame wire between them.

on heavy fabric, such as a hooked rug or tapestry; but protect delicate fabric, such as antique linen, with glass.

Glass comes in four types: Basic soda-lime *float glass* for framing measures 5⁄64" to ⅛" (2–3mm) thick, enough to block about 40 percent of the UV light that can yellow paper, fade colors, and damage artwork. For greater protection, buy coated *UV-blocking* glass that stops more than 97% of UV light, *nonglare* glass, or *combination* glass with both UV and non-glare coatings. (The latter costs up to six times more than float glass.)

Cut your own glass using an inexpensive glass cutter, as shown at *left*, or order it cut to size from a home center, hardware store, or glass store.

Clean the glass thoroughly on both sides and carefully place it over the window mat, art, mounting board, and backing board. Inspect the assembly for trapped dust particles before placing the frame over the package. Then, turn over the frame and the package, and lay it face-down on a clean, cushioned table.

To secure the package within the frame, the pros use a point driver [**Photo G**, **Sources**]. Or you can use a small hammer and brads. Carefully tap the brads halfway into the frame.

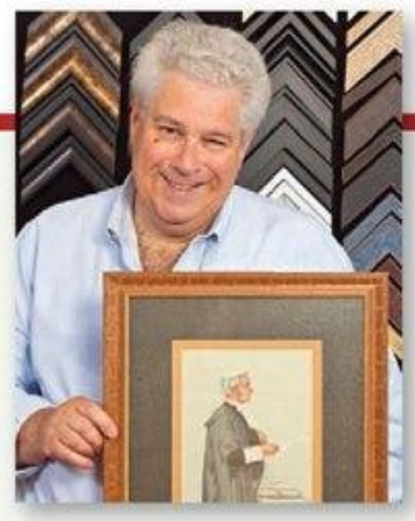
To complete your framing job, apply a border of double-faced tape to the back side of the frame [**Photo H**]. Then create a dust cover by laying a single piece of kraft paper flat on the tape and trim off the excess paper [**Photo I**].

Quick Tip! Skip the spritz. Framers used to mist the dust cover with water to make it drum-tight when dry. But they now discourage the practice to avoid potential damage to the art.

Finally, attach hangers and braided wire to the back of the frame [**Photo J**]. Wrap the wire through the hanger and then around itself for about 2". Don't wrap it too tight or too loose. The top of the wire should be about 20 percent of the way down from the top of the frame when the picture hangs on the wall.

Sources

Miter Vise: Professional Miter Vise no. 03W55, $59.99, Woodcraft, 800-225-1153, woodcraft.com.
Nail Hole Filler: Briwax Touch Up Sticks, 5 colors, $6.49 each; Highland Woodworking, highlandwoodworking.com, 800-241-6748.
Mat Cutters: Deluxe Pull Hand-Held Mat Cutter no. 457689, $39.99, Compact Mat Cutter no. 457564, $130; Hobby Lobby, 800-888-0321, hobbylobby.com.
C+H Advantage Pro Mat Cutters $900–$1,400; framingsupplies.com, 800-334-9060.
Point Driver: Framemaster Point Driver with two boxes of points no. FL-07-555, $76.69, framingsupplies.com, 800-334-9060.



Stuart Altschuler, founder of Prestige Framing Academy in Naples, Fla., has taught picture framing to both professionals and hobbyists for more than 30 years. Widely published in the woodworking and picture-framing fields, he teaches workshops around the country. Learn more about these at pictureframingforwoodworkers.com.

Photography: **John W. Seberg, Seberg Photography**

MORE RESOURCES

RELATED ARTICLE

- "Cut Dead-On Miters Every Time" issue 198 (July 2010) $ woodmagazine.com/miters
- "Miters with Muscle" issue 197 (May 2010) $ woodmagazine.com/reinforcemiters

($=Download this article for a small fee.)

Build this trailer beginning on *page 63*

Construction-Grade Tractor/Trailers

PROJECT HIGHLIGHTS

- Overall dimensions:
  Tractor: 6⅛" wide × 13" long × 6¾" high.
  Side-dump trailer: 6⅛" wide × 21" long × 5⅜" high.
  Lowboy trailer: 6⅛" wide × 28½" long × 2¾" high.
- Materials cost: Lumber: $35.
  Hardware kit for one tractor and both trailers (**Source**): $25.95.
  Hardware kit for tractor only: $9.95.

You can almost smell the diesel as these big rigs muscle their loads to the job site. Or maybe that's just the scent of the walnut cab and chassis.

In this article, you find plans for a tractor and two trailers: a side-dump, as well as a lowboy for transporting two other pieces in our Construction-Grade series, the excavator and bulldozer (see *page 66*). Hardware kits (**Source**, *page 66*) include all the specialty parts and hardware you need. A tractor-only kit allows you to make a second tractor if you choose, so each trailer has one.

First up: The tractor

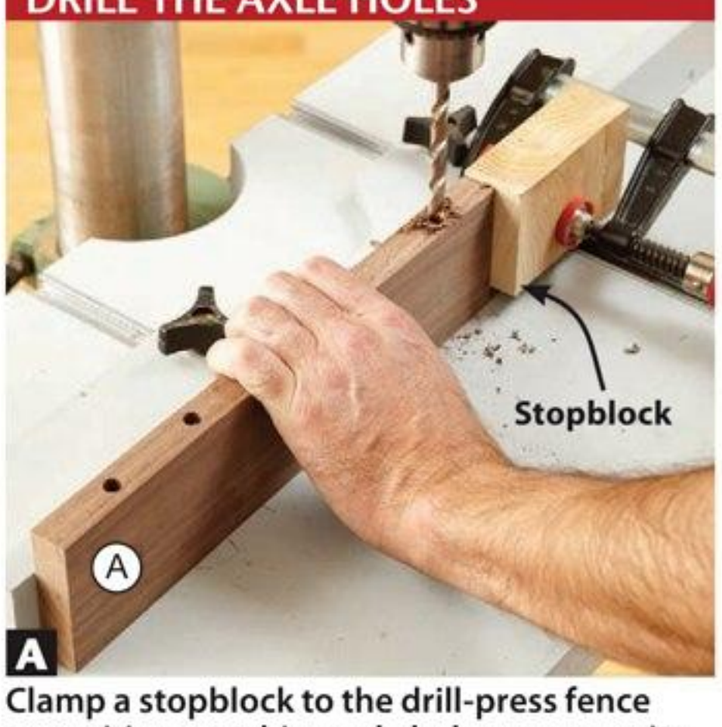
Start with the upper half

Note: *After cutting project parts to size and shape, finish-sand them to 220 grit prior to assembly.*

1 From ¾" walnut, cut the chassis (A) to size [**Materials List**]. Lay out the 11/32" holes along each edge where shown [**Drawing 1**] and drill them [**Photo A**].

2 From a ¾×3⅛×15" maple blank, cut four 3½"-long pieces. Glue these together face-to-face with their edges and ends flush to create a blank for the hood (B) [**Drawing 2**]. After the glue dries, hand-plane and sand the blank to 3" wide.

DRILL THE AXLE HOLES



Clamp a stopblock to the drill-press fence to position matching axle holes on opposite edges. Drill the holes 1¼" deep.

3 Make a copy of the **Hood Top-View Pattern** from the *WOOD Patterns®* insert and spray-adhere it to the top face of the hood blank. At the tablesaw, cut the ⅛" kerfs for the radiator where dimensioned. Spray-adhere a copy of the **Hood Side-View Pattern** to an edge of the hood, aligned with the top face.

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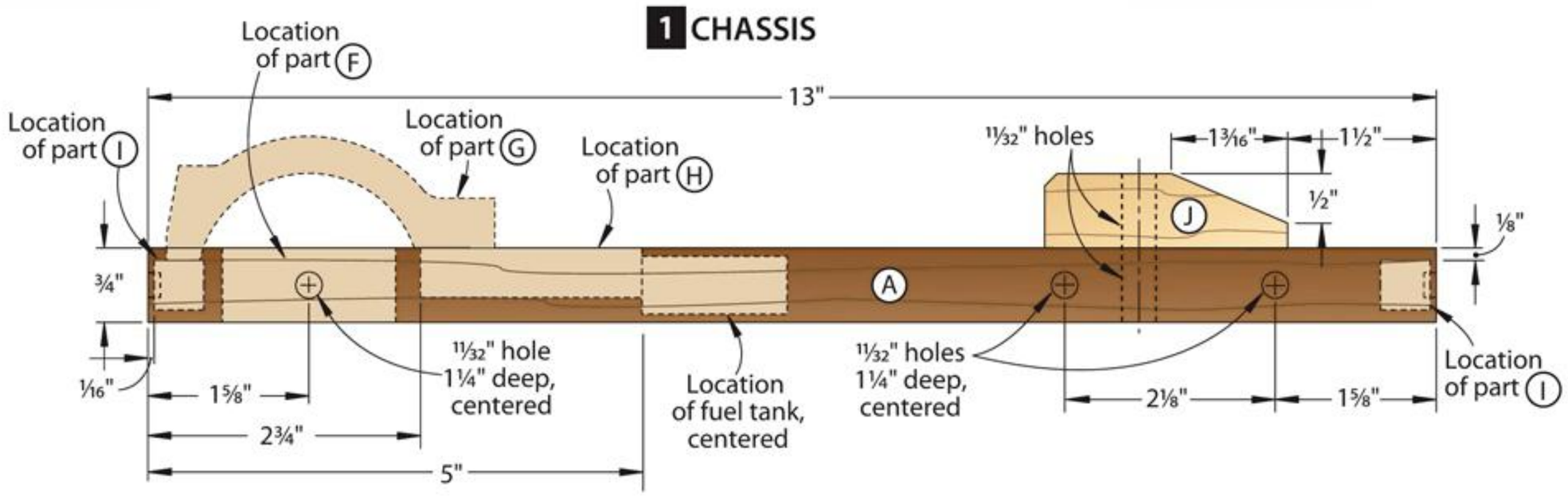
Plans for this trailer begin on *page 65*



(This prevents exposing a joint line when cutting the taper.) Bandsaw and sand to the lines, keeping the bottom square to the sides and back. Rout the chamfers on the top and front.

Quick Tip! Let the spirits remove you. A rag dampened in mineral spirits helps peel the patterns off.

4 From laminated ¾"-thick walnut, cut the cab (C) to size [**Drawing 2**]. Spray-adhere a copy of the **Cab Pattern** to an edge and drill the 1" hole where shown. Bandsaw and sand the cab to shape; then rout the chamfers where shown. Cut the riser (D) and sleeper (E) to size [**Drawing 2**]. Rout ¼" round-overs on all edges of the sleeper except the bottom.

5 Begin assembling the tractor as follows, allowing the glue to dry on each piece before moving on to the next one: Glue and clamp the hood (B) to the chassis (A), flush at the front and edges. ***Note:*** *The front of the chassis has just one set of axle holes.* Next, glue the cab (C) to the chassis, against and centered behind the hood. Then apply glue to the middle 1" of the riser (D) and glue it to the chassis, against the rear of the cab. Finally, glue the sleeper (E) in place [**Photo B**].

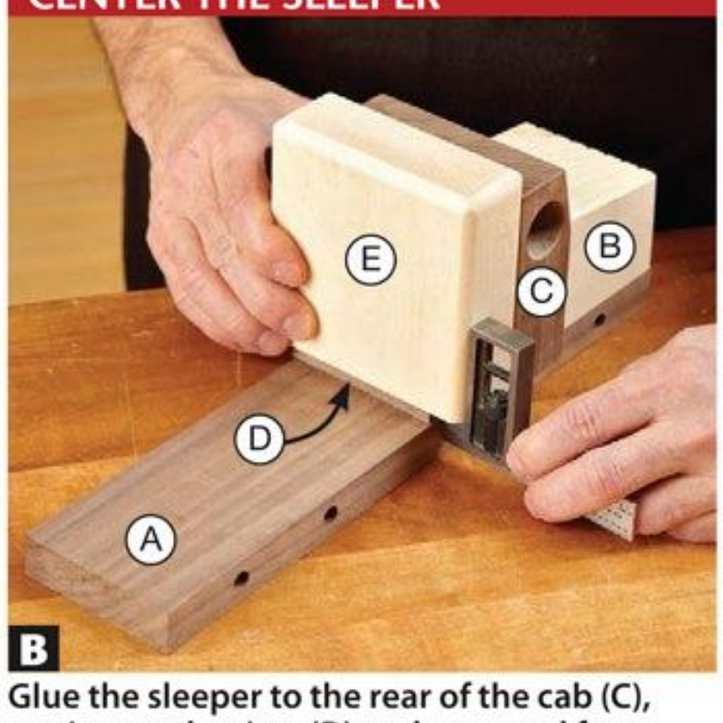
Add the wheels and details

1 Plane a ¾×12" maple blank to ¼" thick, then crosscut the front-wheel spacers (F) to length from the blank. Drill an 11/32" hole centered on each spacer, then rout a ⅛" chamfer across each end [**Drawing 2**]. Glue the spacers in place [**Photo C**].

Quick Tip! Buff and fit. If needed, sand the axle pegs lightly for a good fit.

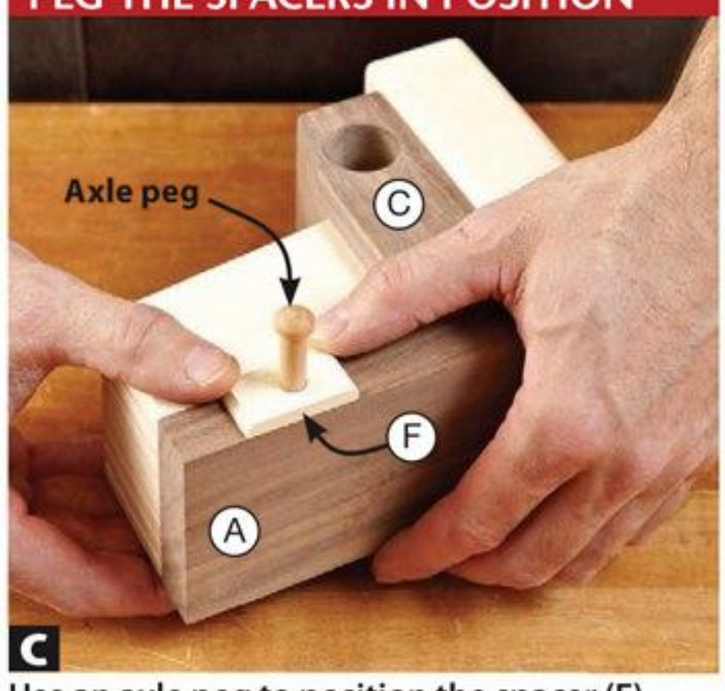
2 For the fenders (G), laminate ¾"-thick stock, then cut two 1×1¼×3½" blanks. Spray-adhere a copy of the

CENTER THE SLEEPER



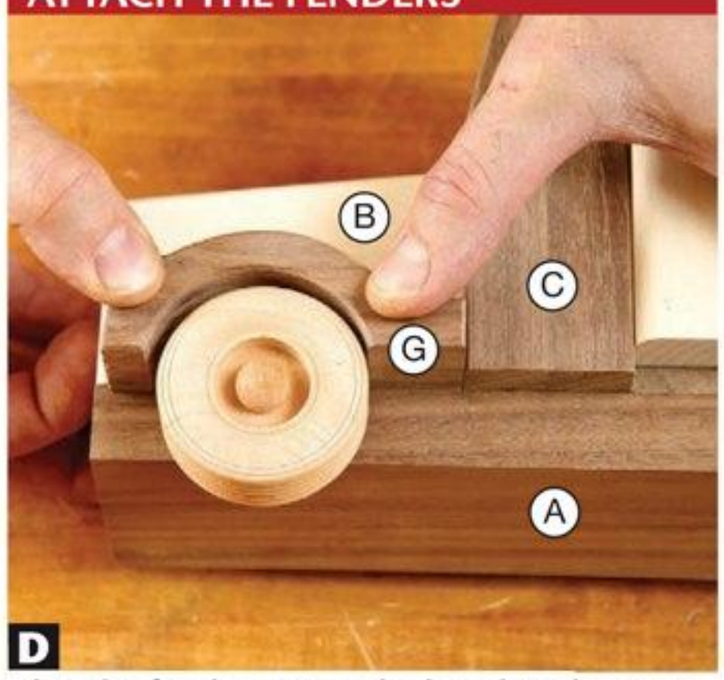
Glue the sleeper to the rear of the cab (C), resting on the riser (D) and centered from side to side.

PEG THE SPACERS IN POSITION



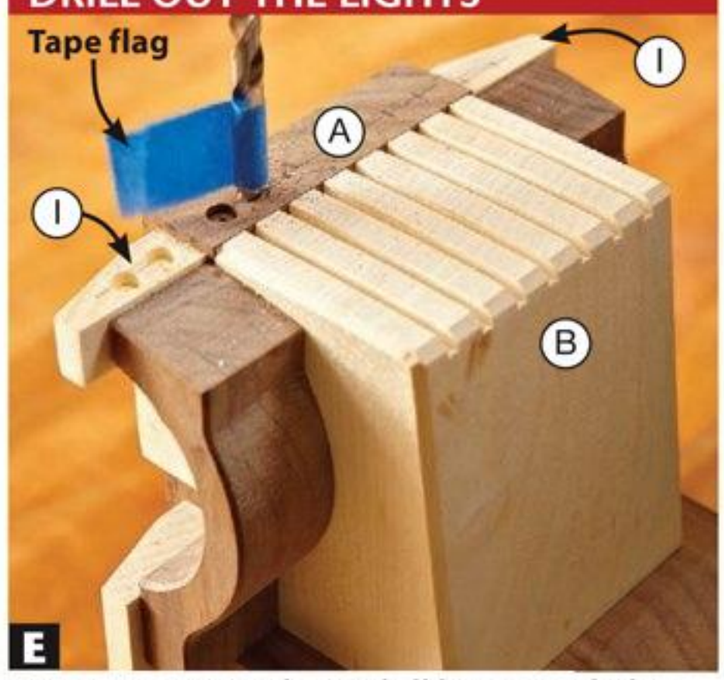
Use an axle peg to position the spacer (F) over the axle hole. Remove the peg before the glue sets.

ATTACH THE FENDERS



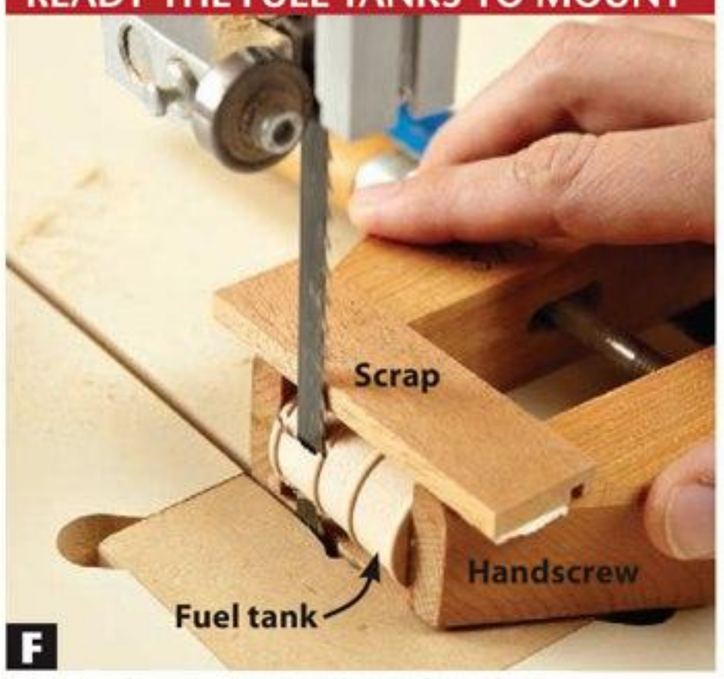
Glue the fenders (G) to the hood (B), keeping the end against the cab (C) and maintaining an even gap between the wheel and fender.

DRILL OUT THE LIGHTS



Wrap tape around a ¼" drill bit to mark the ⅛" hole depth, then drill the lights in the bumpers (I) and chassis (A).

READY THE FUEL TANKS TO MOUNT



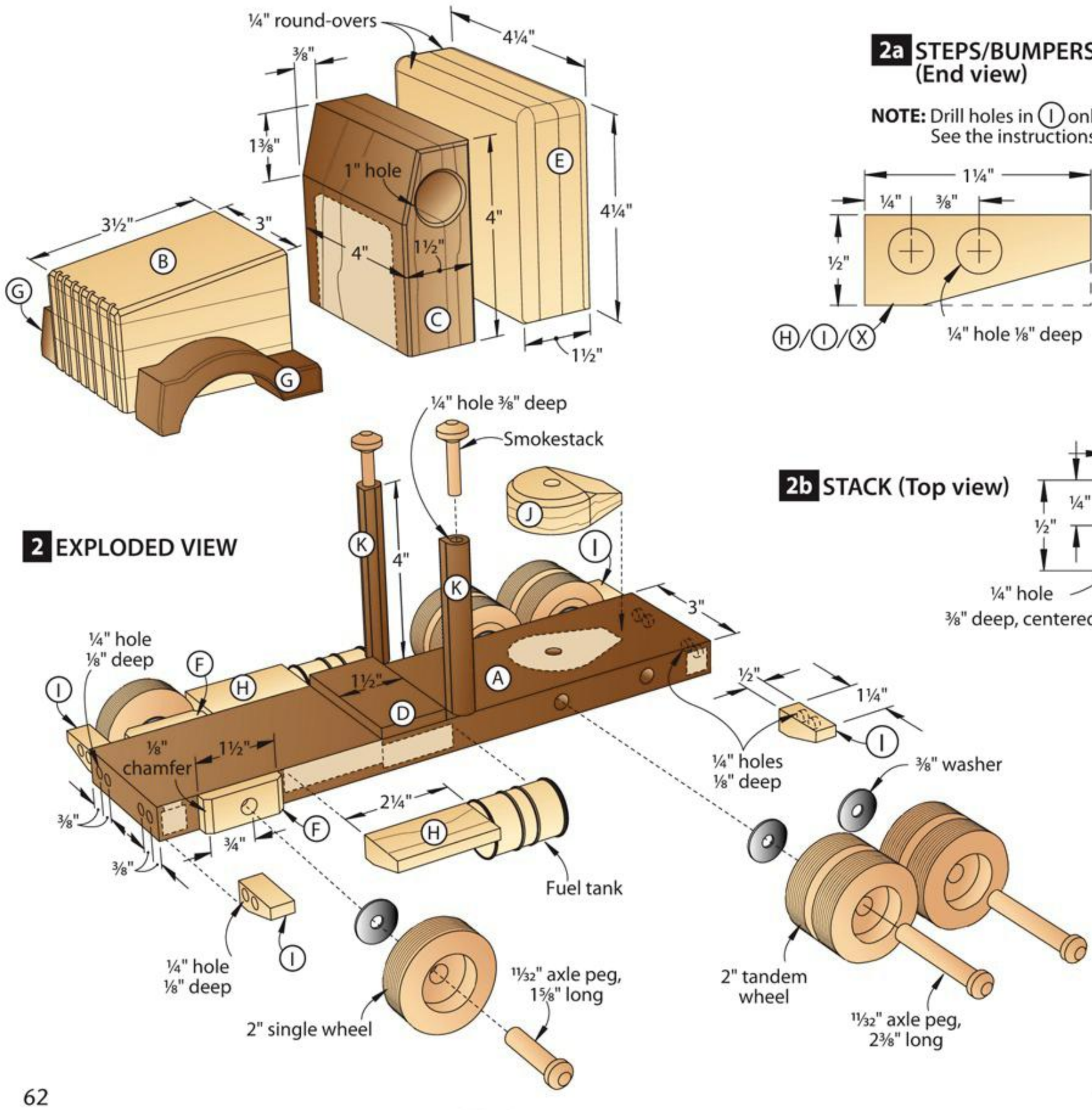
A straight scrap taped to a handscrew provides a visual guide for cutting a flat edge on each fuel tank.

Fender Pattern to one edge of each blank, and bandsaw and sand them to shape. Rout 1/16" chamfers around the outside edges. ***Note:*** *Make sure you make a mirrored pair of fenders.*

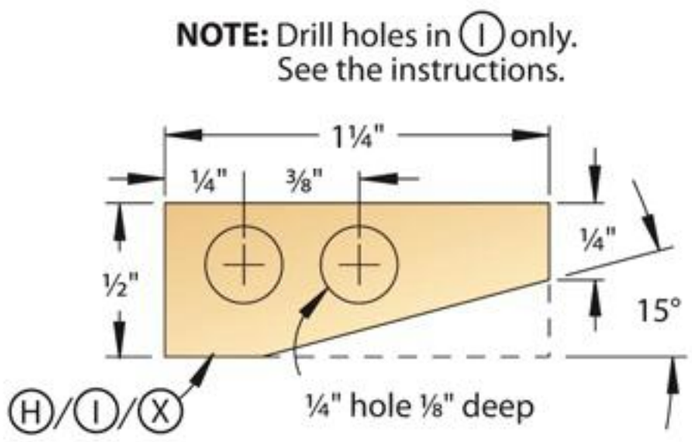
3 Temporarily place a wheel and axle peg in a wheel spacer (F) to help position the fender [**Photo D**]. Hold the fender in position for a couple of minutes until the glue grabs. (Note that the bottom of the fender extends ⅛" below the hood [**Drawing 1**].) Remove the peg and wheel and repeat this process for the other fender.

4 Prepare a ½×1¼×12" maple blank for the steps (H) and bumpers (I). Tilt your tablesaw blade to 15° from vertical, set the rip fence ¼" from the blade, and bevel-rip one edge of the blank [**Drawing 2a**]. ***Safety Note:*** *Use a zero-clearance insert around the blade* [**More Resources**]. Cross-

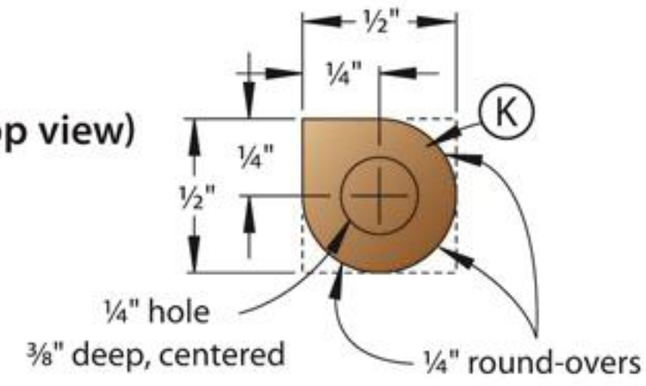
2 EXPLODED VIEW



2a STEPS/BUMPERS/PLATFORMS (End view)



2b STACK (Top view)



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cut the steps and bumpers to length from the blank. (Set aside two bumpers for each trailer you plan to make.) Glue the steps and bumpers in place [**Drawing 1**].

5 After the glue dries, draw a line across each end of the chassis (A) and the bumpers (I), and drill holes to create the headlights and taillights [**Photo E, Drawings 2 and 2a**].

6 Clamp each fuel tank [**Source**] in a handscrew and cut away ⅛" from one edge [**Photo F**]. Sand the cut smooth and flat and glue the fuel tank in place [**Drawing 1**].

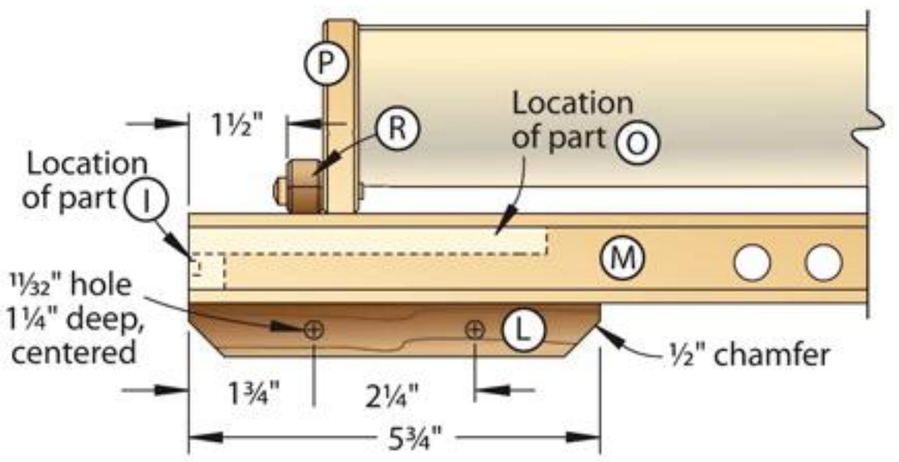
7 Cut the hitch (J) to size. Make a copy of the **Hitch Pattern** and spray-adhere it to the hitch. Lay out the bevel on a side [**Drawing 1**] and bandsaw it. Retrieve the waste piece with the pattern, reattach it to the hitch using hot-melt glue or double-faced tape, and bandsaw the hitch to shape. Remove the waste piece, rout a ⅛" chamfer around the top edge of the hitch where shown, and drill the 11/32" hole. Glue the hitch to the chassis (A), centered on its width. After the glue dries, use the hole in the hitch as a guide to drill an 11/32" hole through the chassis [**Drawing 1**].

8 To make the stacks (K), rout round-overs along three edges of a ½×½×9" walnut blank, leaving one corner square [**Drawing 2b**]. Blend the round-overs by sanding them. Cut the stacks to length, then drill a ¼" hole ⅜" deep in one end of each. With the hole facing up and the square corner to the inside, glue each stack to the back of the sleeper (E), flush with its bottom edge and with the stacks centered on the edge of the chassis (A) [**Drawing 2**]. Glue the smokestacks [**Source**] into the top of the stacks.

9 Tape off the ends of the axle pegs and apply a finish to the tractor (A–K), pegs, and wheels. (We sprayed on three coats of satin-finish polyurethane, buffing between coats with 320-grit sandpaper.) When the finish dries, mount the wheels and ⅜" washers by gluing the axle pegs into the chassis [**Drawing 2**].

Now, the side-dump

3 SIDE-DUMP CHASSIS (Side view)



Make the chassis

1 Cut the side-dump trailer chassis (L) to size [**Drawings 3, 4**], then lay out and drill the holes for the axle pegs. Cut or rout the ½" chamfer on each end.

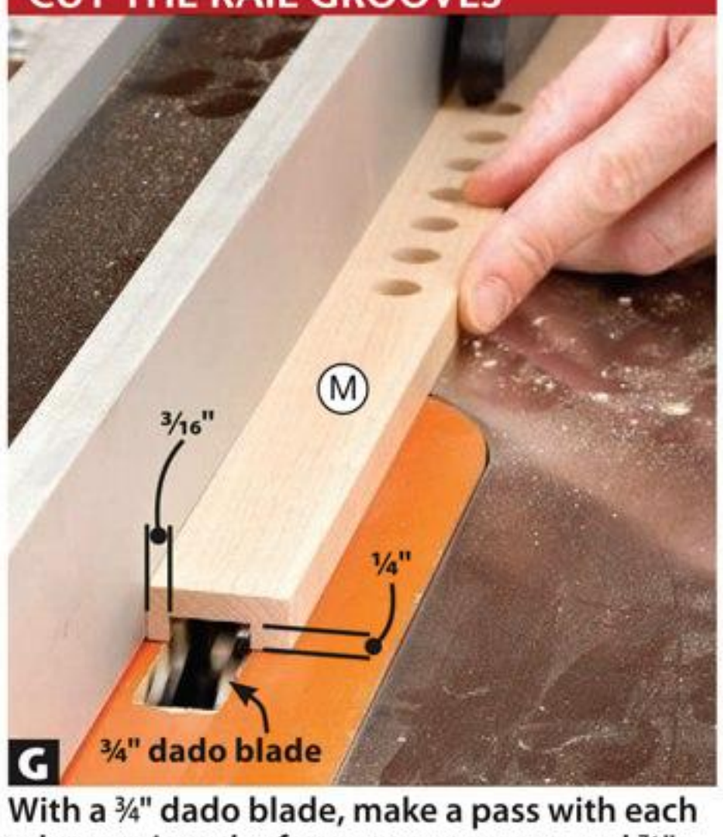
2 Cut the rails (M) to size [**Drawings 4, 4a**]. Make two copies of the **Rail Pattern** and cut them out along the outer lines. Temporarily align one pattern with the end and edges of a rail and mark the center of the first hole. Remove the pattern and lay out the six remaining holes, 1" on center as indicated. Stick the rails together with double-faced tape and drill the holes.

3 Separate the rails (M) and cut a ⅞" groove centered on each one, making a mirrored pair [**Drawing 4a, Photo G**]. Spray-adhere a **Rail Pattern** to the front inside face of each rail, and bandsaw and sand the rails to shape.

4 Cut the hitch plates (N) to size and drill the 11/32" hole through the front one [**Drawing 4**]. Glue them between the rails (M) with the ends and top edges flush. After the glue dries, glue and clamp the chassis (L) to the rails with their back ends and edges flush.

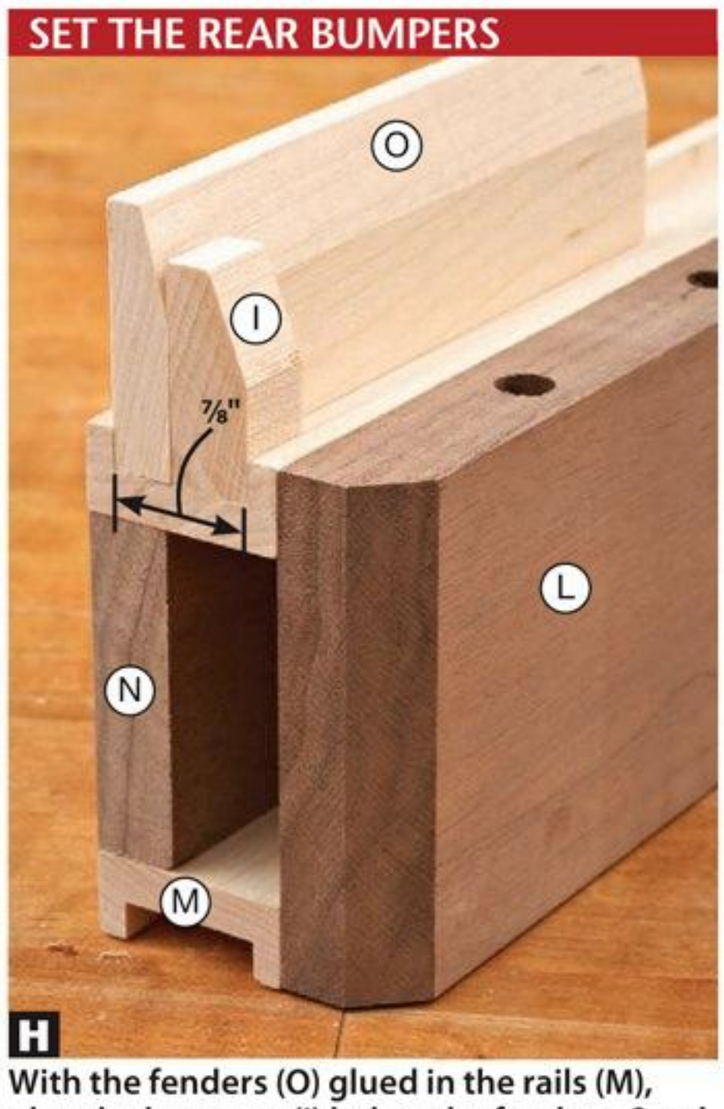
5 Mill a ⅜×1½×12" blank for the fenders (O) and bevel-rip one edge at 15° [**Drawing 4b**]. Crosscut the fenders to length and glue them into the rails (M), flush with the back end [**Drawing 3**]. Retrieve two bumpers (I) and glue them in place [**Photo H**]. After the glue dries, sand the rails, bumpers, and fenders flush, then drill two holes for taillights in each bumper as you did for the headlights [**Drawing 2a**].

CUT THE RAIL GROOVES

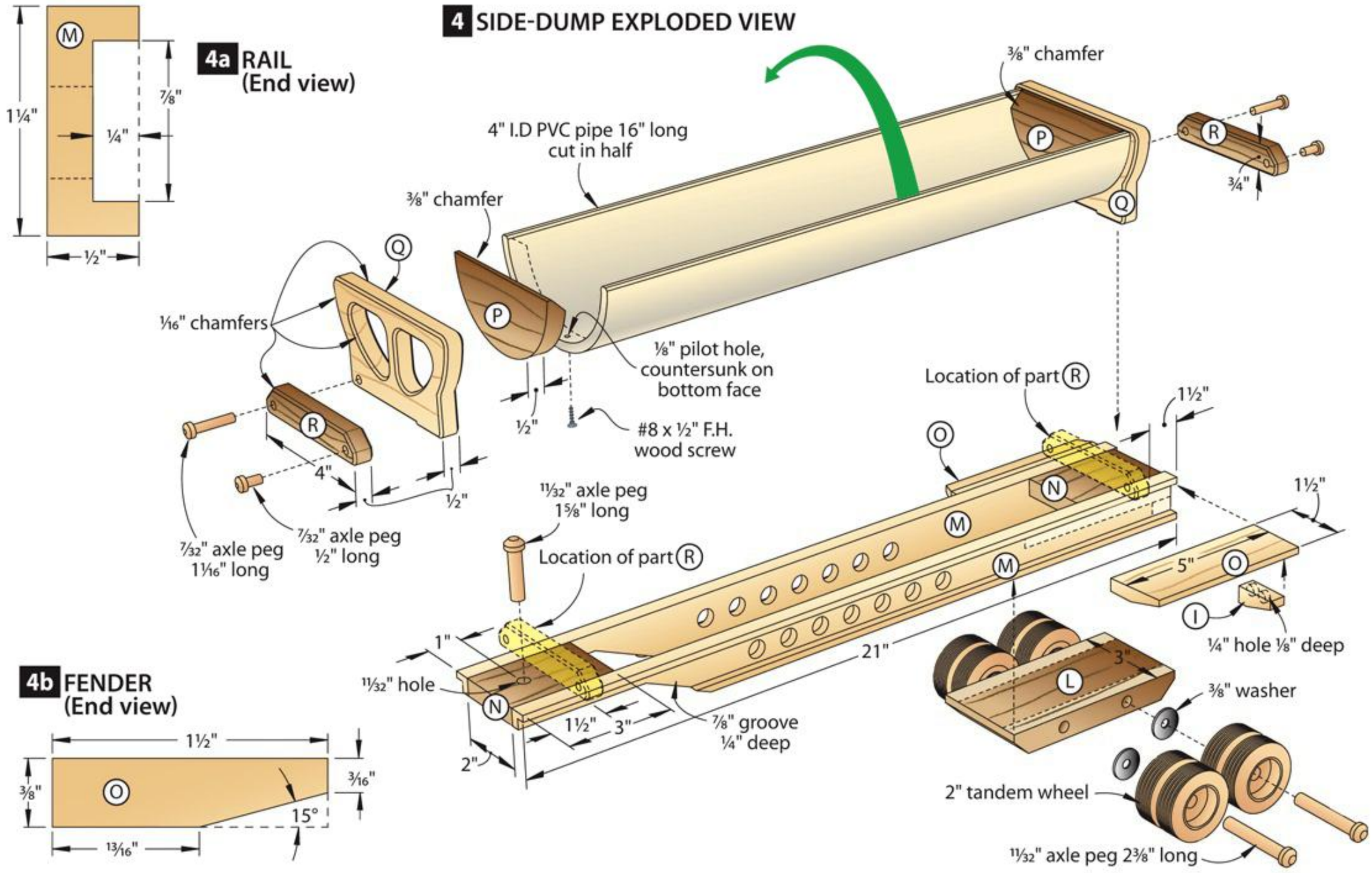


With a ¾" dado blade, make a pass with each edge against the fence to cut a centered ⅞"-wide groove on each rail (M).

SET THE REAR BUMPERS



With the fenders (O) glued in the rails (M), glue the bumpers (I) below the fenders. Sand the bumpers to fit if needed.



Tackle the tipping trailer

1 ***Quick Tip! Steady a cylinder during a cut.*** To cut the 16" length of 4"-diameter PVC pipe for the dump bed, use 1"-long screws to secure the pipe to a 4×16" piece of ¾" plywood [**Photo I**]. Guiding the plywood runner against the rip fence, bandsaw the pipe in half. Sand the cut edges smooth and sand the outside faces with 320-grit sandpaper to remove any markings.

2 Cut two ½×2¼×4½" walnut blanks for the end fillers (P). Rout a ⅜" chamfer along one edge of each blank. Place each blank on your bench, chamfered face down, and stand the half-pipe on each one, aligning the edges of the half-pipe with the chamfered edge of the blank. Trace inside the pipe onto the blanks, then bandsaw and sand them to fit snugly inside the pipe. Secure the end fillers flush to each end of the half-pipe using silicone adhesive and a #8×½" wood screw [**Drawing 4**].

3 From maple, cut two ½×2 11/16×5" blanks for the ends (Q). Make two copies of the **End Pattern** and spray-adhere one to each blank. Cut the ends to shape, rout the chamfers where shown, and remove the patterns. Glue the ends to the end fillers (P) [**Photo J**].

4 Cut the pivot brackets (R) to size and spray-adhere a copy of the **Pivot Bracket Pattern** to each one. Cut a bevel at each end, rout the chamfers, and drill the holes.

5 To allow the dump bed to tip, dry-fit one 1 1/16"-long 7/32" axle peg in each pivot bracket (R) and then into an end (Q) [**Drawing 4**]. Center the dump assembly (P–R) on the frame assembly (I/L–O) so the bed dumps easily. Glue the pivot brackets in place.

6 After the glue dries, remove the pegs from the pivot brackets (R), apply a dot of glue in the holes in the ends (Q), and reinstall the pegs, seating them firmly. To fill the other hole in each pivot bracket, cut two 7/32" axle pegs to ½" long and glue them in place.

7 Mask off the PVC pipe with painter's tape and apply a finish. Remove the painter's tape after the finish dries and install the wheels, washers, and axle pegs as before.

A HALF-PIPE MAKES THE BED

A plywood runner screwed to the PVC pipe prevents the pipe from rolling and guides it along the bandsaw fence during the cut.

ATTACH THE ENDS

Glue the ends (Q) to the end fillers (P). Go lightly on the glue to avoid squeeze-out in the cutouts of the ends.

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Finally, the lowboy

The chassis (S) helps position the hitch deck (V) and hitch sides (U) during glue-up. Keep the bottom edges and front ends flush.

Start with another chassis

1 Cut the chassis (S) and back deck (T) to size [**Drawings 5, 6**]. Attach an auxiliary fence to your tablesaw miter gauge and cut the notches at the front of the chassis. Drill the holes for the axle pegs. Tilt your tablesaw blade to 45° and chamfer one end of the back deck. Glue the back deck to the chassis, with their edges and back ends flush.

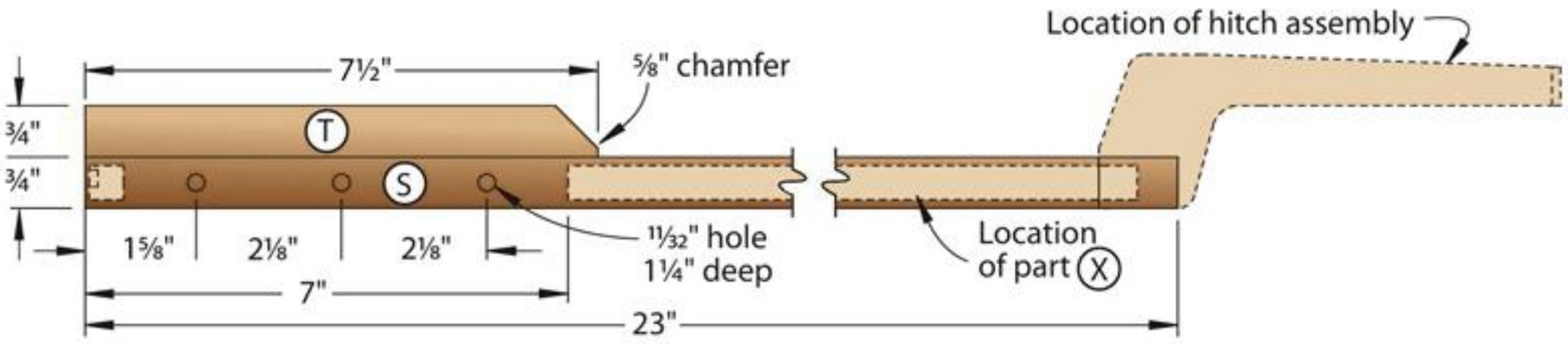
2 Cut the hitch sides (U), hitch deck (V), and hitch riser (W) to size. Glue the hitch deck and riser together with their edges and back ends flush.

3 While the glue dries, make a copy of the **Hitch Side Pattern** and spray-adhere it to one of the hitch sides (U). Stack the hitch sides with double-faced tape between them and cut away only the area under the tongue. With the chassis (S/T) dry-fit between the hitch sides, glue the sides to the hitch deck (V) and hitch riser (W) [**Photo K**]. Do not glue these parts to the chassis yet.

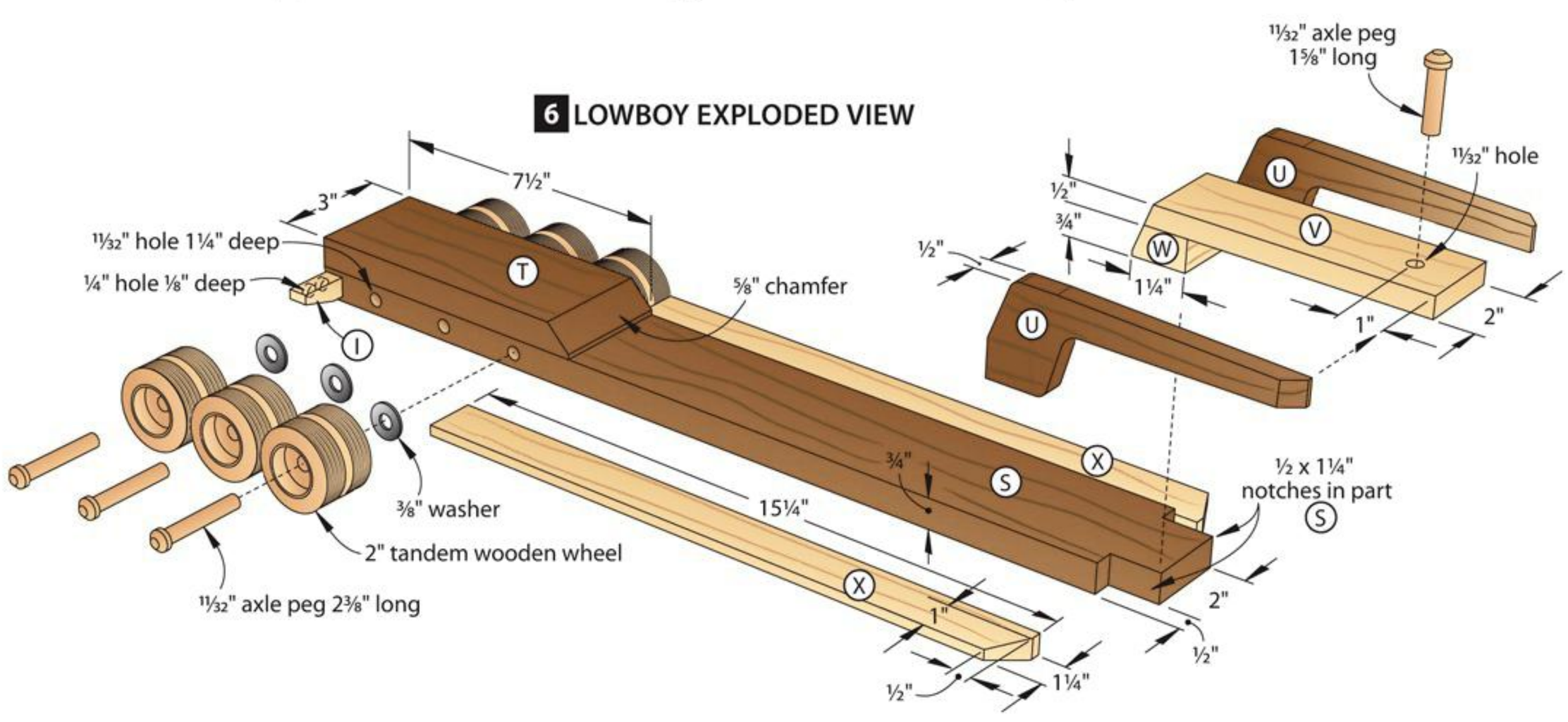
4 After the glue dries, remove the chassis (S/T). Cut and sand the back of the hitch assembly (U–W) to shape [**Photo L**]. Remove the pattern, and drill the 11/32" hole in the hitch deck (V) [**Drawing 6**]. Apply glue to the bottom face of the hitch riser (W) and in the chassis notches, then clamp the hitch assembly to the chassis.

5 From ½"-thick maple, cut the platforms (X) to size, and bevel-rip one edge as you did with the steps (H) [**Draw-**

5 LOWBOY CHASSIS (Side view)



6 LOWBOY EXPLODED VIEW

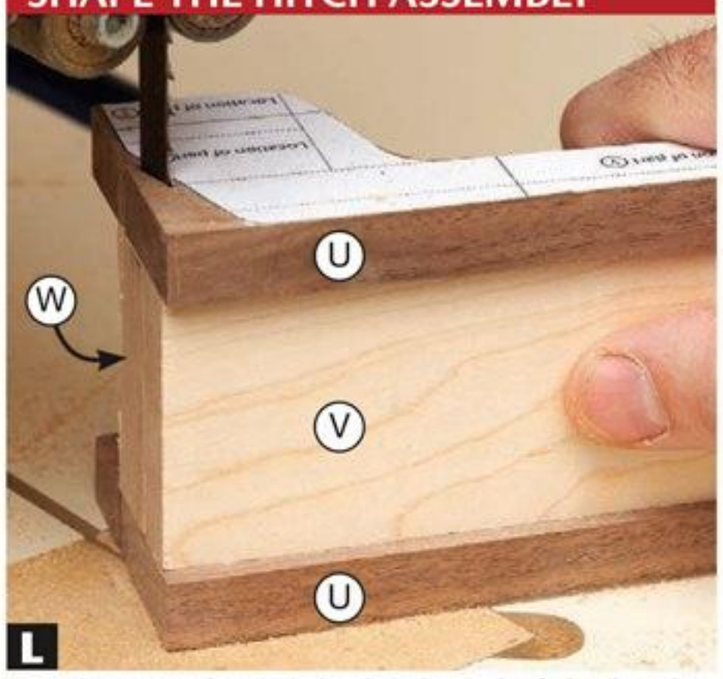


ing 2a]. Cut the bevel on the front ends [**Drawing 6**] and glue the platforms in place [**Drawing 5**]. Glue the last two bumpers (I) to the chassis (S/T) and drill the taillight holes as before.

6 Sand any areas needing it, then tape off the axle pegs as before. Apply a finish, then install the flat washers, wheels, and axle pegs. Your rig is ready to load and hit the road.

Produced by **Craig Ruegsegger** with **Kevin Boyle**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

SHAPE THE HITCH ASSEMBLY



Bandsaw and sand the back end of the hitch assembly (U–W), following the pattern lines.

MORE RESOURCES

FREE PLANS AND ARTICLE

- To make a zero-clearance insert go to: woodmagazine.com/zeroclearance.
- Build a jig to help rout small parts safely: woodmagazine.com/routsmall.
- Tips for cutting small parts safely: woodmagazine.com/sawsmall.

BUILD THE WHOLE SET

With this tractor and trailers, our Construction-Grade series grows to six pieces. The crane, *center* (issue 185, September 2008) lifts and lowers its bucket, and spins. The articulated boom of the excavator, *right rear* on the lowboy (issue 194, November 2009), reaches and scoops. The bulldozer, *front* (issue 199, September 2010), raises and lowers its blade. The bulldozer also fits perfectly on the lowboy trailer. If you don't own these issues, you can download plans for these projects for a small fee at woodmagazine.com/cgtoys.

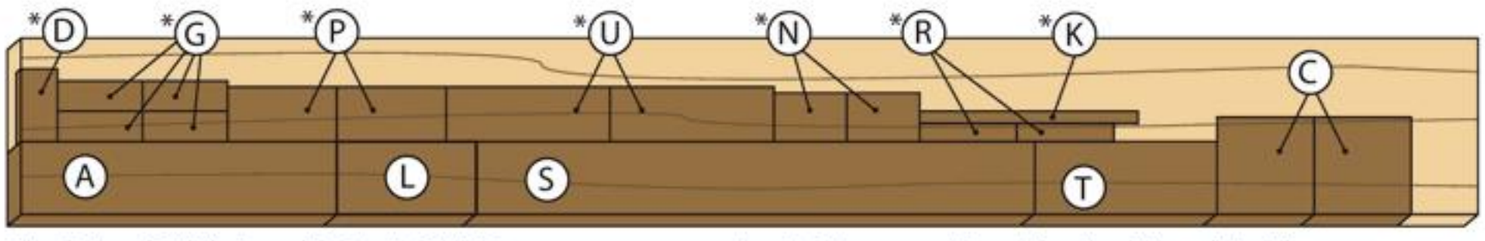
Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Tractor						
A	chassis	¾"	3"	13"	W	1
B*	hood	2½"	3"	3½"	LM	1
C	cab	1½"	4"	4"	LW	1
D	riser	¼"	3"	1½"	W	1
E	sleeper	1½"	4¼"	4¼"	LM	1
F*	front-wheel spacers	¼"	¾"	1½"	M	2
G*	fenders	1"	1¼"	3 5/16"	LW	2
H*	steps	½"	1¼"	2¼"	M	2
I*	bumpers	½"	1¼"	½"	M	8
J	hitch	¾"	1⅞"	2½"	M	1
K*	stacks	½"	½"	4"	W	2
Side-dump trailer						
L	chassis	¾"	3"	5¾"	W	1
M	rails	½"	1¼"	21"	M	2
N	hitch plates	½"	2"	3"	W	2
O*	fenders	⅜"	1½"	5"	M	2
P*	end fillers	½"	2"	3⅞"	W	2
Q	ends	½"	2 1/16"	5"	M	2
R	pivot brackets	½"	¾"	4"	W	2
Lowboy trailer						
S	chassis	¾"	3"	23"	W	1
T	back deck	¾"	3"	7½"	W	1
U	hitch sides	½"	2¼"	6¾"	W	2
V	hitch deck	½"	2"	6¾"	M	1
W	hitch riser	¾"	2"	1¼"	M	1
X	platforms	½"	1¼"	15¼"	M	2

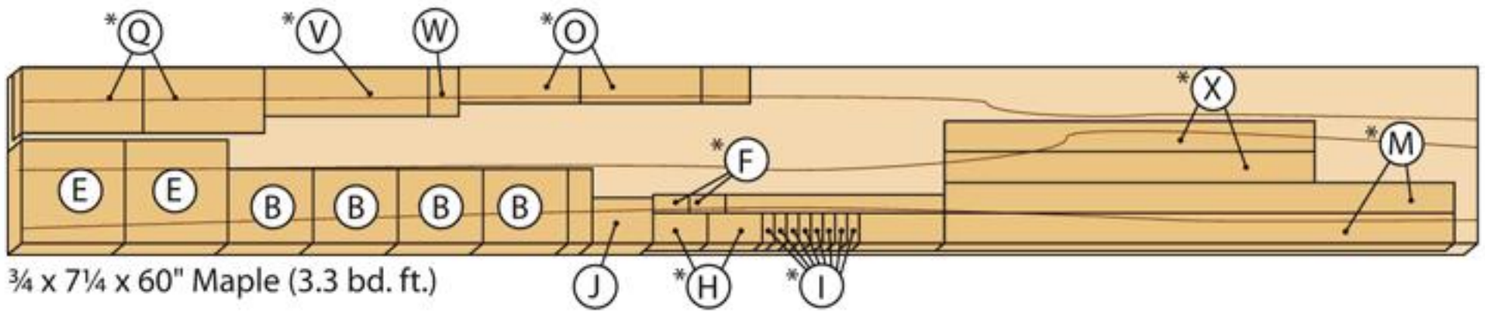
*Parts initially cut oversize. See the instructions.

Materials key: W–walnut, LM–laminated maple, LW–laminated walnut, M–maple.
Supplies: Double-faced tape, spray adhesive, #8×½" F.H. wood screws (2), 4×16" PVC pipe.
Blade and bits: Stack dado blade; 45° chamfer, ¼" round-over router bits; ⅛", 7/32", ¼", 11/32", ½", 1" drill bits.

Cutting Diagram



¾ x 7¼ x 60" Walnut (3.3 bd. ft.) * Plane or resaw to the thicknesses listed in the Materials List.



¾ x 7¼ x 60" Maple (3.3 bd. ft.)

Source

Wood/hardware kits: To build the tractor and both trailers, order kit no. 5016 containing dual wheels (14), single wheels (2), 11/32×2⅜" axle pegs (14), 11/32×1⅝" axle pegs (4), 7/32×1 1/16" axle pegs (4), fuel tanks (2), smokestacks (2), and ⅜" flat washers (16); $25.95.

To build just the tractor, order kit no. 5017 containing dual wheels (4), single wheels (2), 11/32×2⅜" axle pegs (4), 11/32×1⅝" axle pegs (2), fuel tanks (2), smokestacks (2), and ⅜" flat washers (6); $9.95, Meisel Hardware Specialties, 800-441-9870, meiselwoodhobby.com.

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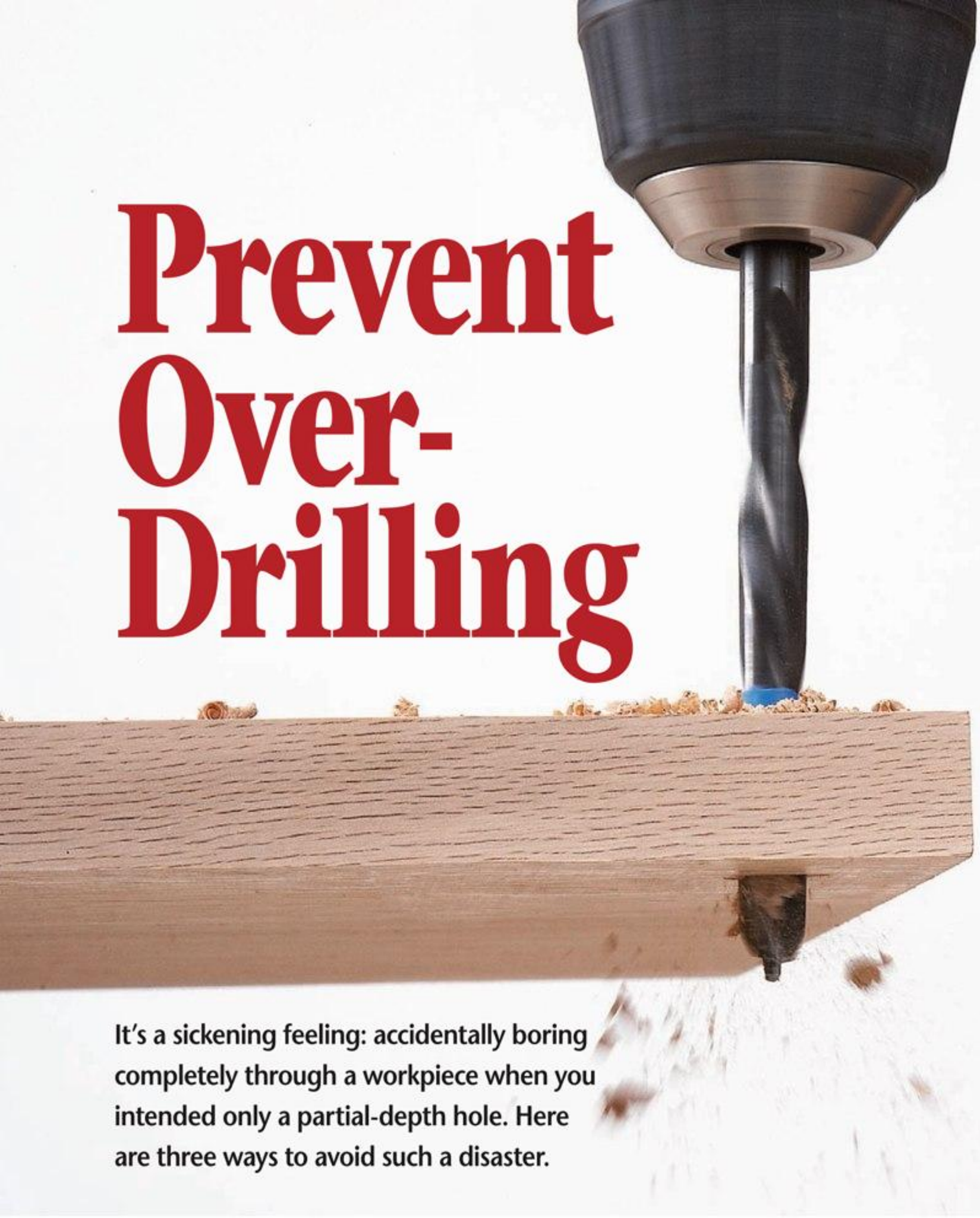
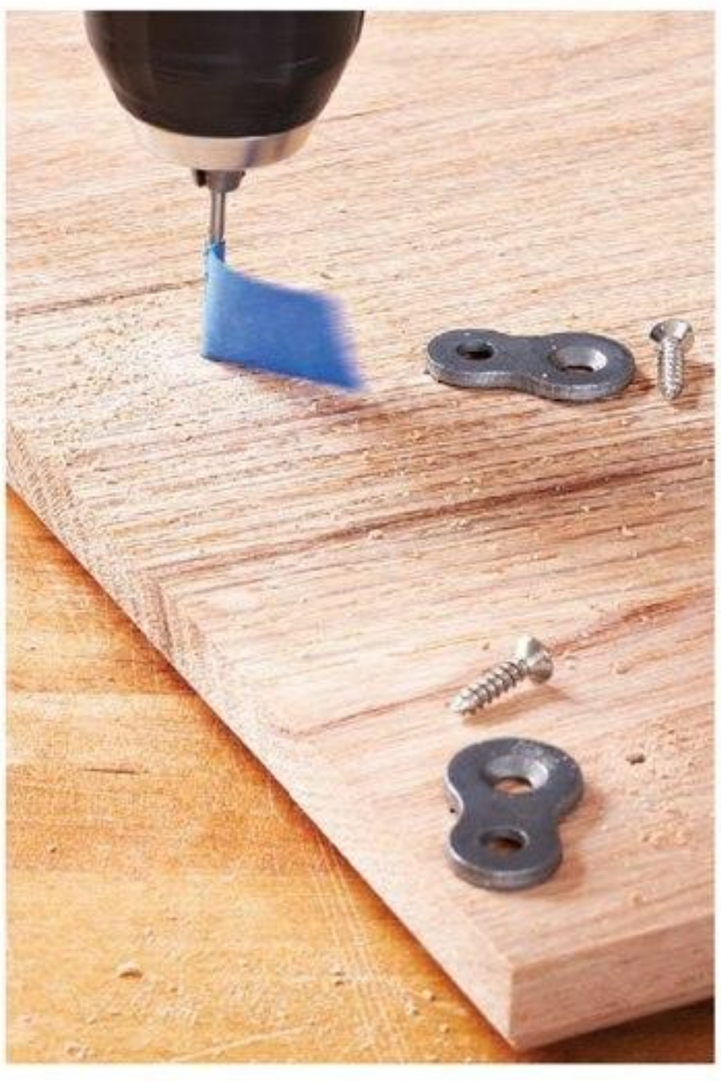
Prevent Over-Drilling



It's a sickening feeling: accidentally boring completely through a workpiece when you intended only a partial-depth hole. Here are three ways to avoid such a disaster.

Tip #1: Masking tape works—if you flag it

There's nothing new about using masking tape on a bit to indicate drilling depth, but it can be difficult to tell when that tape sleeve hits the workpiece. And if you go a little too far, the sleeve tends to slide up the bit, making subsequent holes too deep. Rather than simply wrapping the tape around the bit like a sleeve, stick the loose ends together to form a flag. When the flapping flag wipes away all the sawdust around the hole, you've hit your depth mark.

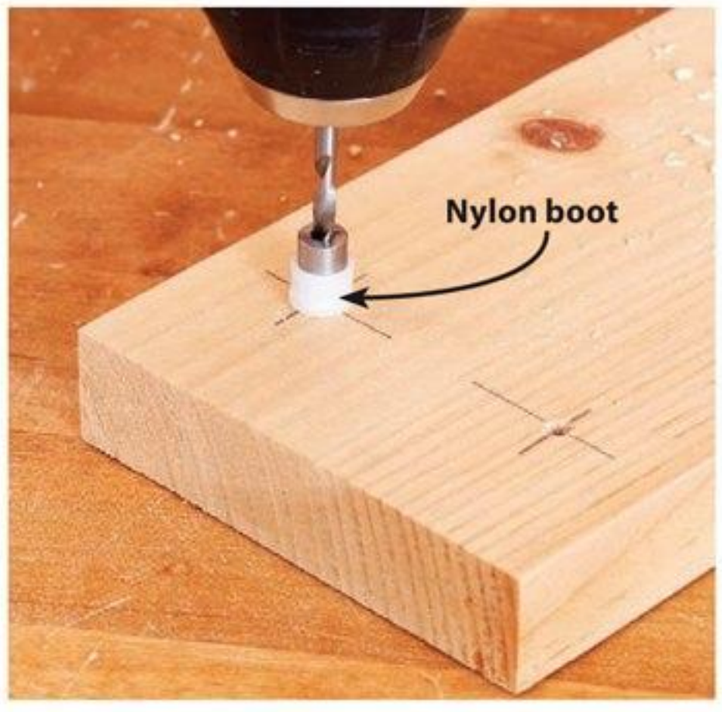


Tip #2: Sometimes, chuck jaws are all you need

Try this if your drill bit is short enough (or your screws long enough): Mount your bit in the drill chuck so the length showing measures slightly longer than the length of your screw. This makes it nearly impossible to drill too deep because the chuck jaws prevent it. However, those jaws can mar your workpiece, so stop just short of the jaws touching the wood.

Tip #3: Stop collars provide the ultimate solution

For a few dollars' investment, stop collars give you a can't-fail means of repeatedly drilling to a predetermined depth. Slide the collar onto the bit, then tighten the setscrew(s) securely against the outside surfaces of the flutes (not inside the flutes or on their cutting edges). Be warned: Steel stop collars, although priced attractively, can mar your wood surface. Instead, try SlipStop collars, shown *below*. A nylon boot allows the stainless-steel collar to spin within it, preventing wood damage.



Sources

Steel stop collars: 7-piece set (⅛"–½"), #68946, $11, Rockler Woodworking and Hardware, 800-279-4441, rockler.com.

SlipStop nylon stop collars: 6-piece set (⅛"–½"), #908-298, $47, Woodworker's Supply, 800-645-9292, woodworker.com.

Why Buy Big when benchtop will do?

Save some scratch (and space) by going smaller, without sacrificing performance.

As the Rodney Dangerfield of the power-tool world, benchtop tools often get "no respect, no respect at all!" True, floor-standing machines typically offer more capacity and power than their benchtop brethren. But in some cases, the tinier tools pack all the punch you need, and the big boys may be overpriced overkill for the home woodworker. In this article, we'll show the benchtop machines that make sense (and save you dollars), and even reveal when to ignore our advice and go big.

First, a few general observations:

■ ***They cost less for a reason.*** To balance size, features, and price, makers of benchtop tools often use smaller, less-powerful motors and lower-quality components (bearings and switches, for example). If you're not running the tools hard 8 hours a day, don't sweat the difference. (For exceptions to the rule, see "When to stick with stationary," *next page*.)

■ ***"Benchtop" doesn't always mean "portable."*** You won't necessarily gain floor space with a benchtop machine. A gangly drill press or stout planer doesn't tuck away easily underneath a benchtop or inside a cabinet. So, you may still need to make a stand to get these to a good working height. (Find plans for tool stands at woodmagazine.com/toolstands.)

■ ***Large workpieces need extra support.*** The light weight or small footprint of a benchtop tool can make it less stable, especially when working large pieces. Be sure to secure such machines as a drill press and planer to a heavy, broad base to prevent tipping.

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5 Benchtop tools we'd buy in a heartbeat

DRILL PRESS

Why buy? A benchtop drill press with a 10–12" swing capacity (the widest piece in which it can center a hole) handles 90 percent of boring tasks required for making furniture and cabinets. After all, how often do you drill more than 5" from the edge of a project part? And with 3"-plus of quill stroke, most benchtop models bore plenty deep for mortises.

Cost savings: about $200

Go big instead if you routinely bore holes larger than 2" into hardwoods, drill into steel, or sand aggressively with chuck-mounted drums.

MORTISER

Why buy? Even if you make a lot of mission furniture, a benchtop mortiser will serve you just fine, thanks. The argument for a benchtop model is so one-sided, in fact, that even professional production shops rarely have floor-standing mortisers these days.

Cost savings: about $700

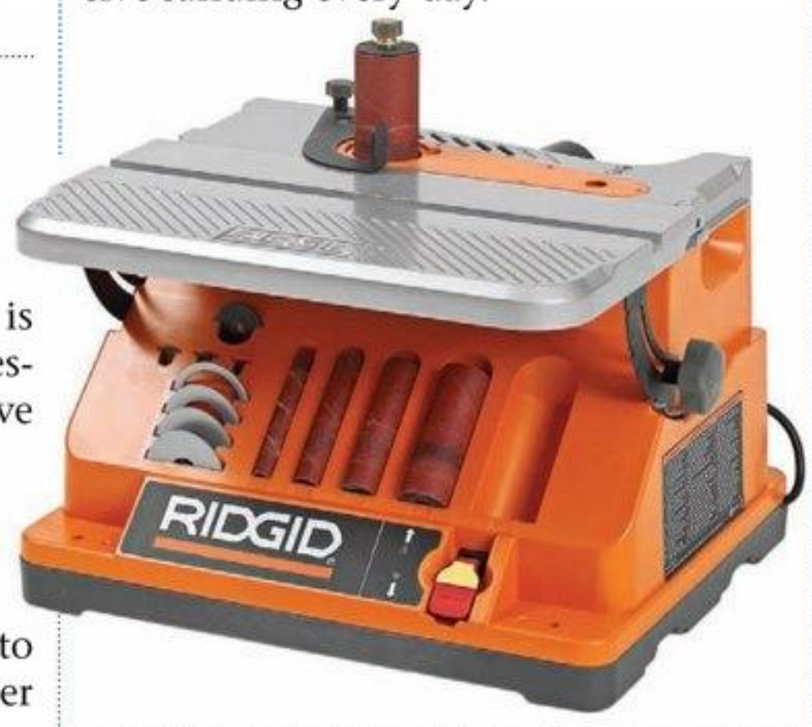
Go big instead if you'll routinely bore mortises larger than ½" (for bed rails, posts, and the like). You'll need to step up to a floor-stander—or another method, such as a drill press—to get that kind of capacity.

SPINDLE SANDER

Why buy? Drums on benchtop models can sand inside curves on stock up to about 3" thick. The typically plastic gears and light-duty motor won't last as long as the components inside their beefier brothers, but you'd have to burn up two or three of these to exceed the cost of one floor-standing sander. Swap the spindle for the belt attachment on Ridgid's EB4424 (*below*) and add edge-belt sanding at a benchtop price.

Cost savings: $500–$900

Go big instead if you must do aggressive sanding every day.

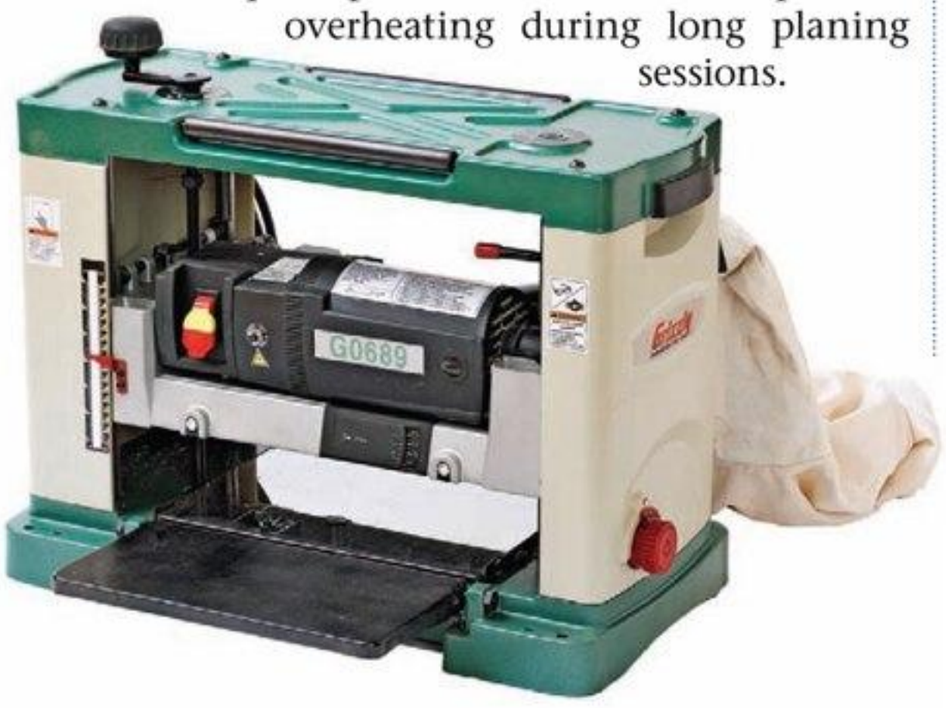


PLANER

Why buy? A 13" planer costs you only 2" of width capacity versus a 15" floor-standing model, but you gain floor space thanks to the smaller footprint (especially compared to a stationery planer with infeed and outfeed extensions). As a bonus, benchtop machines often deliver a smoother finish, with easier-to-adjust knives, to boot.

Cost savings: $400–$1,500

Go big instead if you regularly hog rough lumber down to thickness. A stationary planer cuts deeper and feeds lumber faster than a benchtop model, saving you time on big jobs. Also, the universal motors on benchtop planers require periodic downtime to prevent overheating during long planing sessions.



LATHE

Why buy? Legs on a lathe add weight that dampens vibration. Bolting down a benchtop lathe does the same thing. Today's midi-lathe, equipped with an accessory bed extension, has enough distance-between-centers and power to turn spindles 35" or so in length: plenty for table legs. And you can stow a benchtop model when not in use.

Cost savings: $200–$300

Go big instead if you plan to turn bowls, platters, or vessels larger than about 10–12" in diameter.

When to stick with stationary

Diminutive machines don't make sense in every case, and here's where we'd bite the bullet and buy big to begin with:

- ***Tablesaw.*** Although some benchtop saws now boast stationary-saw features, the cost of those better machines rapidly approaches the price of a good contractor-style tablesaw, which offers greater rip and crosscut capacity (not to mention a better fence and miter gauge), a quieter and more powerful induction motor, and easier adjustments.
- ***Bandsaw.*** Benchtop models lack the power and capacity to resaw hardwoods or rough out a bowl blank, so what you end up with is a glorified jigsaw for curve cutting. Even then, you'll get frustrated quickly by poor blade guides and blade-tensioning systems.
- ***Jointer.*** Long face-jointing sessions can overheat the universal motor on a benchtop unit. And you will have long sessions making twice as many passes as with a stationary jointer due to the limited depth of cut. Fences tend to be flimsy, cut-quality marginal, and tables too short to joint workpieces longer than about 4'.

Produced by **Dave Campbell**

BASIC-BUILT™
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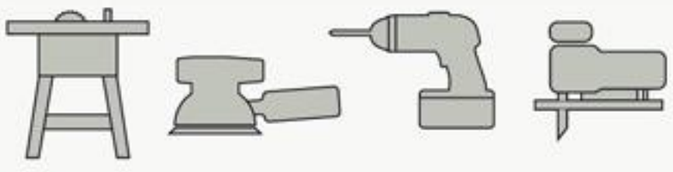
Shaker Bench
With Storage

Build this sturdy bench in only a weekend. Then stain and seal it—or turn it into an "instant antique" with milk paint as shown *below*.

WHAT YOU'LL NEED



■ **Materials:** For a natural-wood look (shown *above*): ¾"-thick red oak and a quarter-sheet of ¾" oak-veneer plywood. For painted look: the same sizes and thickness of poplar and birch-veneer plywood.

PROJECT HIGHLIGHTS

■ Overall dimensions:
36"L × 14¾"D × 18¾"H.
■ You'll learn to plug and hide screw holes.
■ Materials Cost: Oak: $140 Poplar: $100

Start with the panels

Note: *In the steps to follow, we'll build the unpainted version of the bench. Substitute poplar and birch ply for the painted version.*

1 From edge-glued ¾" oak, cut the ends (A) 13" wide, and bottom shelf (B) to size [**Materials List**, *page 73*.]. (For a free video about edge-gluing panels, see **More Resources** on *page 73*.) Smooth any uneven joints along the panel (A,B) surfaces using a random-orbit sander.

2 Rip ⅝" strips from each edge of both ends (A). ***Note:*** *Save these offcuts as edging strips (D) for use later.*

3 Cut the top shelf (C), but this time from ¾" plywood. Then rip all the panels (A,B,C) to a finished width of 11¼".

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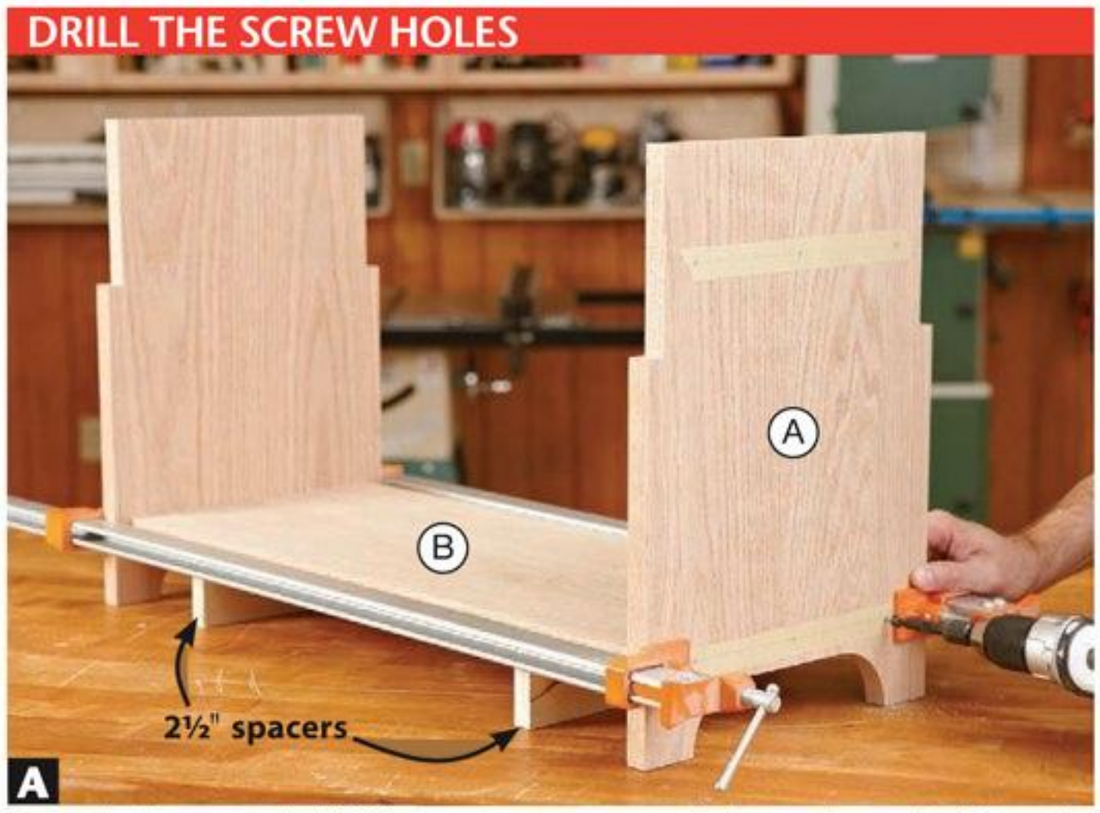
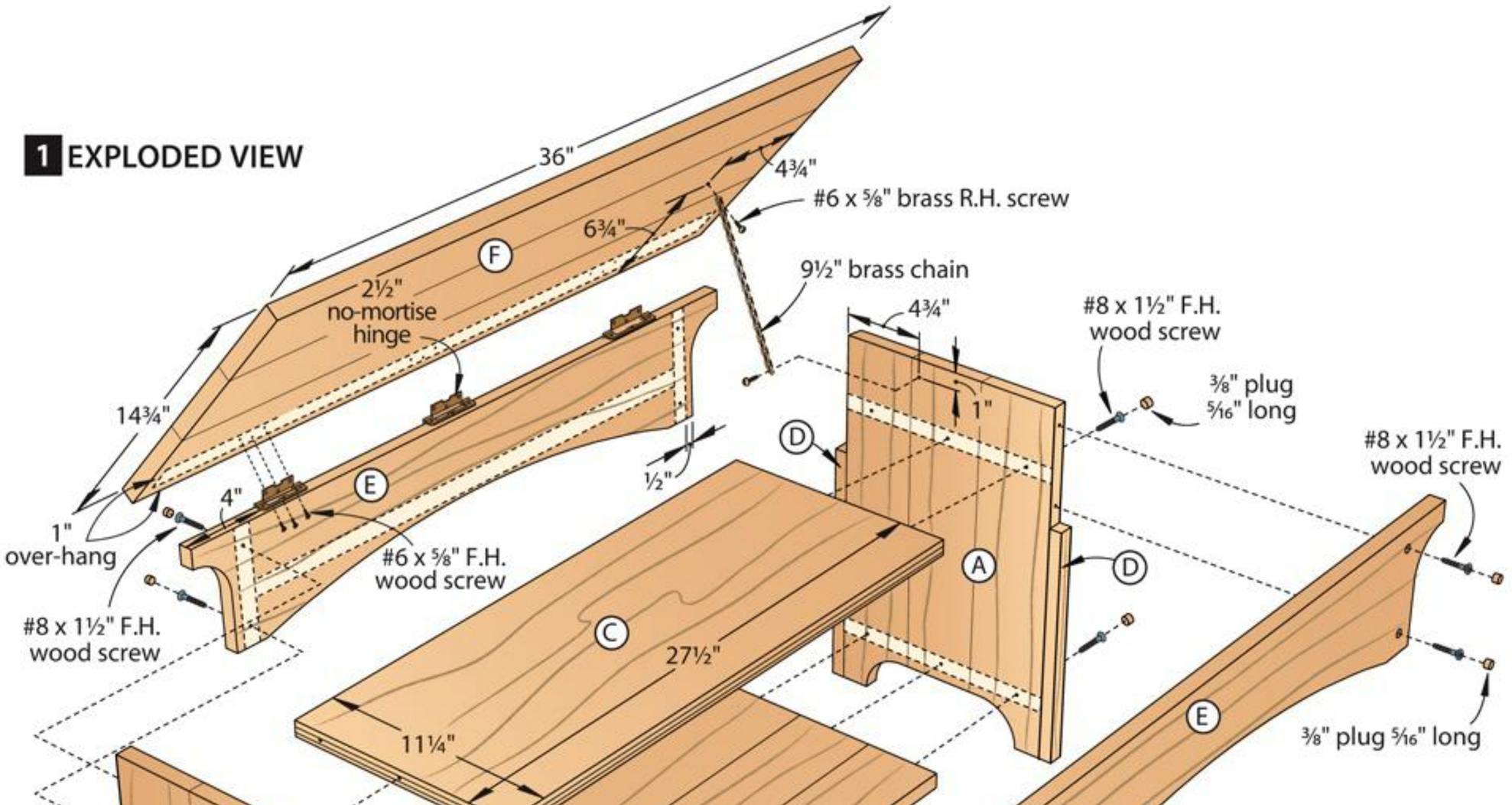


Rest the bottom shelf (B) on two spacers and clamp the ends (A) to the shelf. Drill counterbored holes for the screws and plugs.

Use two 11"-long spacers to position the top shelf (C) level. Then clamp across the top and drill the counterbored screw holes.



Next, crosscut the ends (A) to a finished length of 18", and the shelves (B,C) to a finished length of 27½" [**Drawing 1**].

4 To create notches on the edges of each end (A), cut the edging strips (D) 12" long. Then, glue these strips back onto the edges of the ends (A), flush with the bottom ends [**Drawings 1 and 2**].

5 Lay out the cutouts at the bottoms of the ends (A) [**Drawing 2**]. Jigsaw the cutouts to shape with a 10 tpi blade. Cut to the waste side of the layout line and sand to the line. ***Quick Tip! Simple sanding blocks.*** Keep different sizes of PVC pipe around for sanding radii. Finish-sand all the pieces to 180 grit.

Assemble the bench

1 Mark centerpoints for six screw holes on the outside of each end (A) [**Drawings 1 and 2**]. ***Quick Tip! Eliminate the lines.*** Lay masking tape over the area and mark the hole locations on the tape [**Photo A**]. This prevents erasing or sanding the lines off the wood later.

2 Using spacers for positioning [**Photo A**], clamp the bottom shelf (B) centered on the ends. Drill counterbores ¼" deep at each centerpoint. Then, drill a pilot hole centered in each counterbore.

LAY OUT THE ARC

Use a 3/16 × 36" scrap for a fairing stick. Position two clamps to hold the fairing stick on the end marks and pull the center up to the center mark. Then scribe a pencil line along the inside of the fairing stick.

GLUE AND SCREW THE RAILS

Clamp the rails (E) in the notches and screw them in place. The rails should stand 1/8" proud of the edging strips (D).

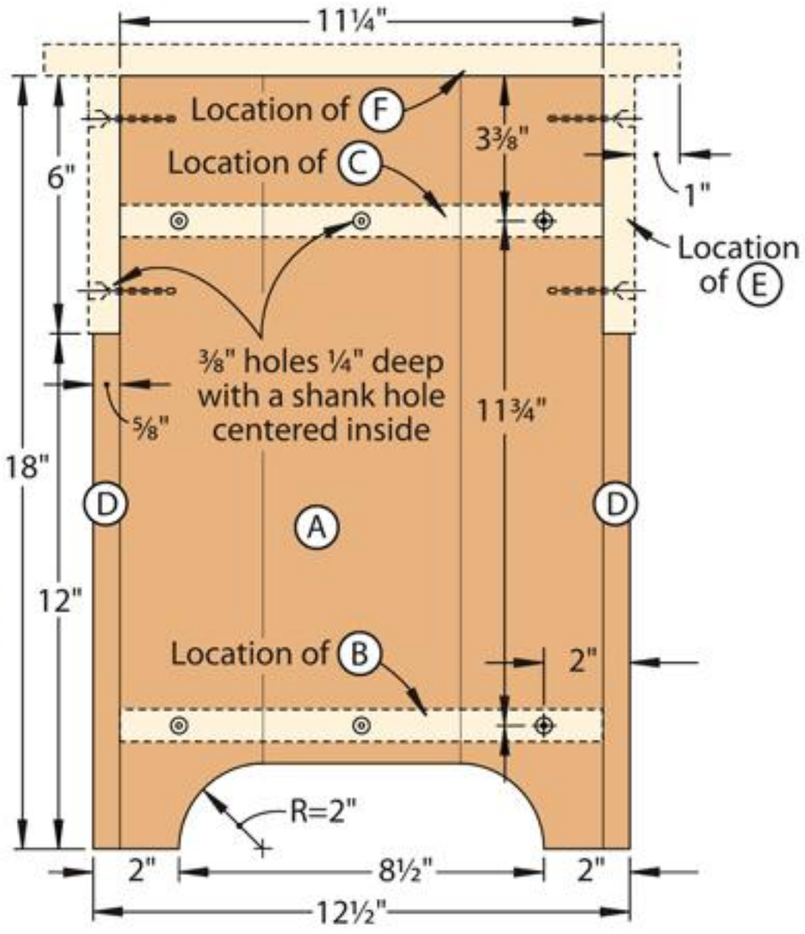
(Or use a combination countersink and pilot-hole bit and drill both holes at the same time.) With all the holes drilled, glue and screw the bottom shelf in place.

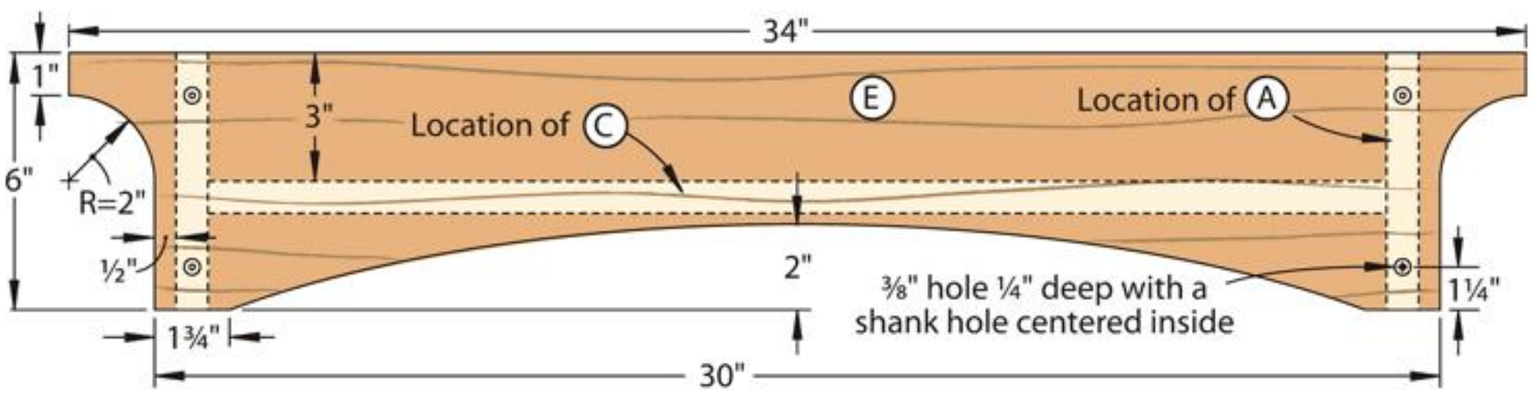
3 Using spacers, position the top shelf (C) in place [**Photo B**]. Drill counterbores and pilot holes, as in **Step 2**, and attach the top shelf to the ends (A). (See **Drawing 1** on *page 71*.)

4 From 3/4" stock, cut two 6×34" blanks for the front and back rails (E). Lay out the decorative details on each end [**Drawing 2**]. For the long arc on the bottom edge, make a mark 3 3/4" from each end and one in the center 2" up from the bottom. Then, use a fairing stick to draw the cutline [**Photo C**]. Cut and sand the front rail (E) along the line and use it as a template for the back rail (E).

5 Apply a small bead of glue along one edge of the top shelf (C) and clamp the front rail (E) to the notches in the ends (A). Drill and drive screws as before [**Photo D**]. Repeat for the back rail. Finally, plug all of the screw holes. (See the **Shop Tip**, *below*.)

2 PARTS VIEW

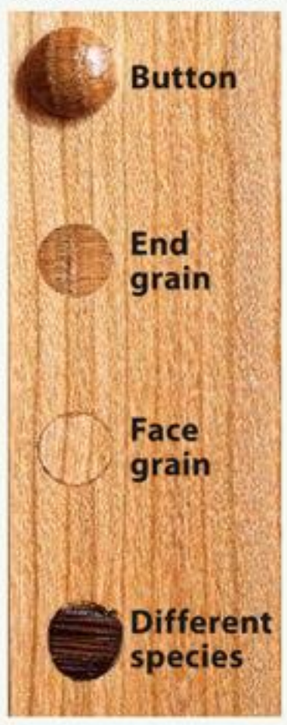




SHOP TIP

4 ways to dress up (or play down) screw holes

Wooden plugs both hide screw holes and add a decorative feature. Here are some of the options:



- ***Buttons.*** These mushroom-capped plugs have decorative domed tops that stand proud of the surface.
- ***End-grain plugs.*** Because you're not matching face grain to face grain, these plugs are more obvious. End-grain plugs can be cut from standard dowel, and require no special tools.
- ***Face-grain plugs.*** With careful grain matching, these hide holes best. Buy them premade. Or for best color match, cut them from scrap project stock using a plug cutter in a drill press.
- ***Different-species plugs.*** To really make a plug into a decorative element, try using plugs from contrasting species (walnut in oak, for example).

Trim off flush-fitting plugs with a flush-cutting saw (see *below*). Or place a piece of card stock with a hole it it over the plug to protect the surface and use any fine-tooth saw.

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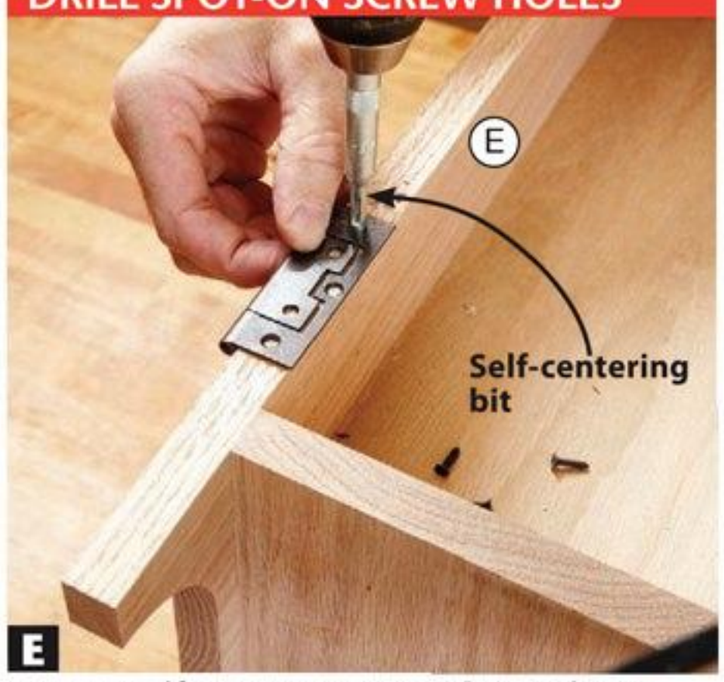
DRILL SPOT-ON SCREW HOLES



Using a self-centering ("Vix") bit as shown here ensures that every screw hole will be centered in the hinge hole.

INSERT "MARKER" SCREWS

Lift the hinge leaf and place a ¼" long flathead wood screw in each hole with the point facing up.

MARK THE SCREW CENTERPOINTS

Center the lid (F) on the bench assembly and tap lightly with a mallet. This will leave centerpoints for the screws.

Add the lid and finish up

1 From edge-glued stock, cut the lid (F) to size [**Drawing 1**].

2 Locate the three no-mortise hinges on the top edge of the back rail (E) [**Drawing 1**]. Predrill for the screws [**Photo E**]. Then install the hinges. ***Quick Tip! Eliminate broken screws.*** Test the pilot hole first in a piece of scrap to ensure it's large enough for the screw.

3 To locate the lid (F) on the hinges, place #4×¼" wood screws facing up in the holes in the hinges [**Photo F**]. Then place the lid down over the bench carefully so that you have an equal overhang on all four sides, and mark the centerpoint locations for the screws [**Photo G**]. Lift the lid, remove the small screws, and attach the lid with the longer screws supplied with the hinges.

4 Remove the lid and hardware, and finish-sand to 220 grit. Stain, if desired, and then apply a clear finish. (We used Zar Salem Maple stain with three coats of water-based polyurethane, sanding with 220 grit between coats.)

5 Reattach the hinges and install a short length of chain [**Drawing 1**] so the lid (F) doesn't hit against the back rail (E) when opened.

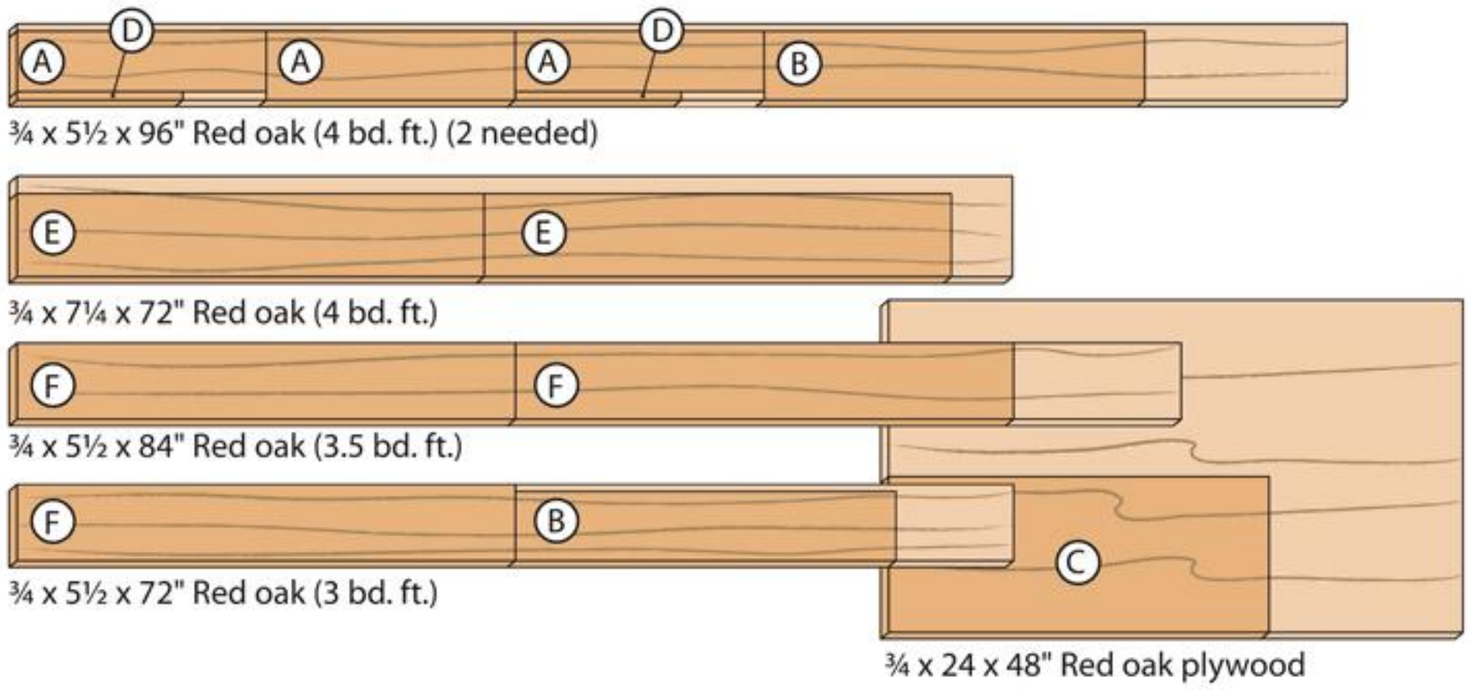
Milk paint adds a country look

Another option for this bench: Build it from poplar and paint it. Brush on a couple of coats of latex primer, sanding lightly between coats. Then, for an authentic country appearance, use milk paint. We used General Finishes Brick Red Milk Paint ($19.99/quart, item no. 825758, woodcraft.com).

To create an antiqued look, use 150-grit sandpaper to soften the edges that would get worn the most: top edges and corners, top edges of the bottom shelf, and outside and inside edges of the ends. (See photo *right, top.*) Don't sand too much. A little goes a long way.

Next, apply a dark walnut stain over the sanded areas. This darkens them a bit and gives a "worn look." (See photo *right, bottom.*) Keep the finish off the paint as much as possible. Once the stain dries, seal the whole bench with a couple of coats of water-based polyurethane for protection.

Cutting Diagram



Produced by **Doug Hicks** with **Kevin Boyle**
Project design: **Jeff Mertz**
Illustrations: **Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	ends	¾"	11¼"	18"	EO	2
B	bottom shelf	¾"	11¼"	27½"	EO	1
C	top shelf	¾"	11¼"	27½"	OP	1
D	edging strips	¾"	⅝"	12"	O	4
E	front/back rails	¾"	6"	34"	O	2
F	lid	¾"	14¾"	36"	EO	1

*Parts initially cut oversize. See the instructions.

Materials key: EO–edge-glued oak, OP–oak plywood, O–oak.
Supplies: #8×1½" flathead wood screws (20), ⅜" plugs, 5/16" long (20), 2½" no-mortise hinges (3) with screws, 9½"- long brass chain with #6×⅝" roundhead screws (2).
Blade and bits: High-quality jigsaw blade with 10 teeth per inch, 7/64", 5/32", ⅜" drill bits (or combination countersink and pilot-hole bit), self-centering ("Vix") bit.

MORE RESOURCES

FREE VIDEO
- "Clamp and Sand Panels Flat"
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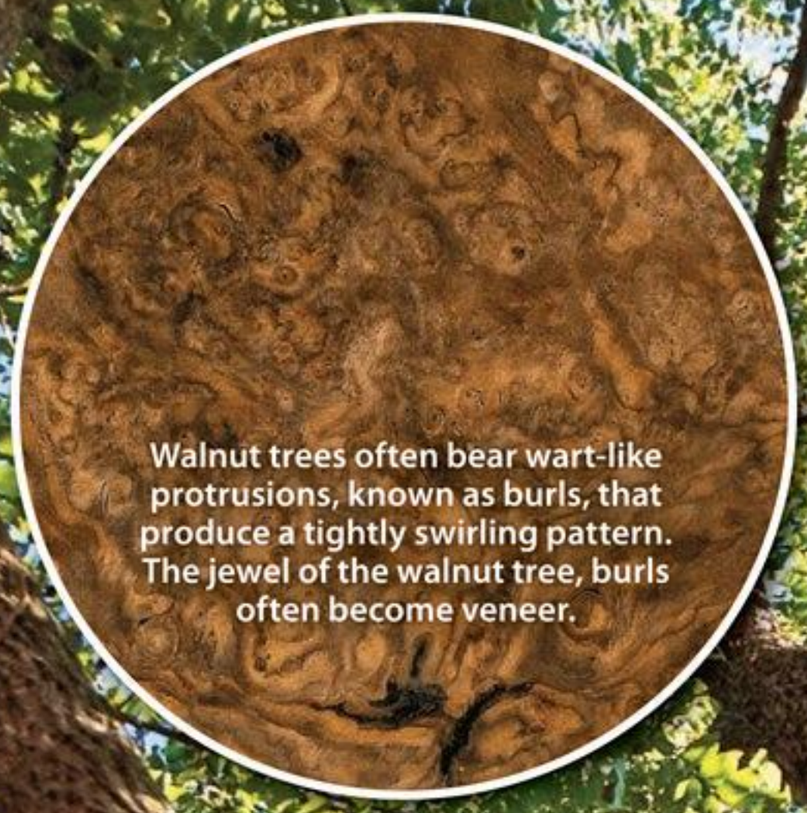
Nuts about Walnut

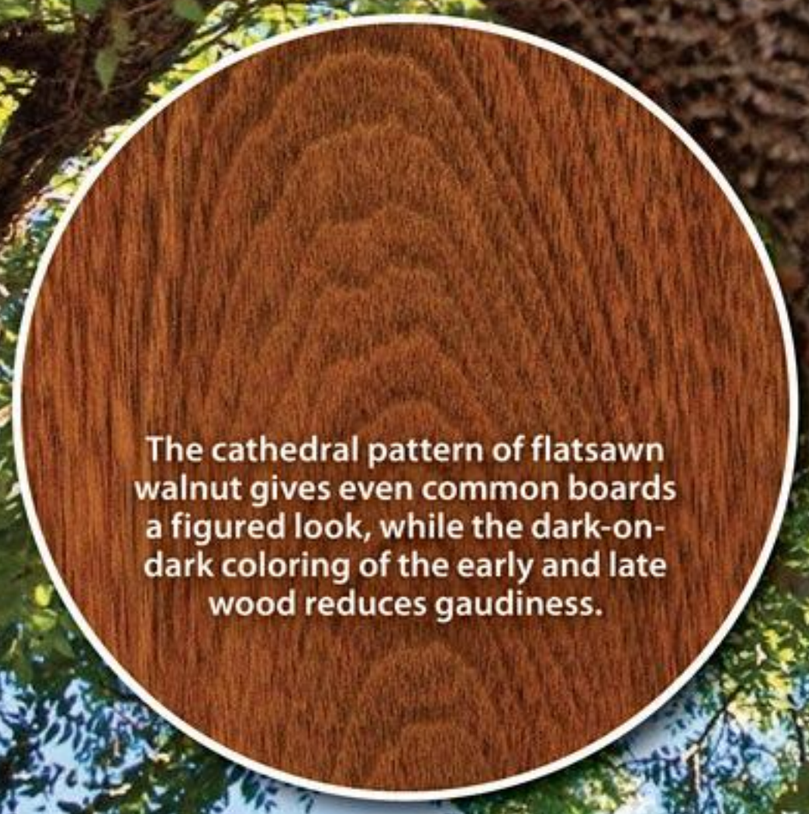
Gorgeous figure, easily worked, and fun to finish: What's not to love about black walnut?



Walnut trees often bear wart-like protrusions, known as burls, that produce a tightly swirling pattern. The jewel of the walnut tree, burls often become veneer.

4 Desirable Grain Patterns

Crotch wood, where branches intersect the trunk of the tree, is normally rejected in other lumber, but yields prized V-shaped flare patterns in walnut.



The cathedral pattern of flatsawn walnut gives even common boards a figured look, while the dark-on-dark coloring of the early and late wood reduces gaudiness.

Commonly available as veneer, quartersawn walnut's consistent striped pattern makes a good choice when you need to avoid overpowering grain.

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Ranging across the forests of the entire eastern half of the United States and up through southern Ontario, black walnut (*Juglans nigra*) has resurged in popularity as furnituremakers return to one of North America's most traditional hardwoods. They're finding out what the early masters knew: Working with this dark, rich beauty is a pleasure.

It's all about the figure

Black walnut trees commonly reach heights of 100' or more with 3'-diameter trunks, yielding copious amounts of consistent, straight grain—a lumberman's dream. Woodworkers also seek out walnut because its crotch wood produces spectacular flame-like grain. Another source of highly figured wood—burls—are common in walnut. Even lowly stumpwood often produces compressed and wavy grain, making the walnut tree one of the most all-around coveted lumber trees.

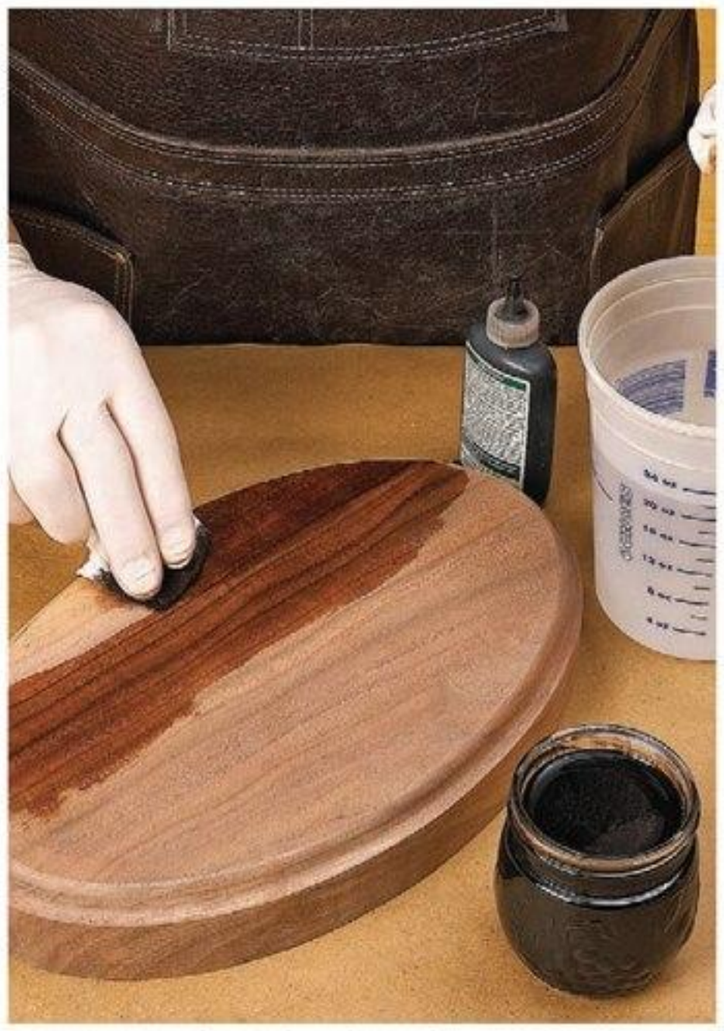
With heartwood ranging from deep purple-brown to reddish-tan, walnut's cream-colored sapwood offers a sharp contrast that most woodworkers avoid in visible areas of projects. With early and latewood consisting of a similar color and pore-size, the growth rings show, but not with the distinct contrast of oak or ash.

Works like a dream

Though relatively hard, walnut won't put undue strain on your machinery or muscles when hand-working it. And it holds crisp details from a router bit, carving knife, or other cutting tools.

For walnut glue-ups, pick up a bottle of dark glue, such as Titebond II Dark Wood Glue (titebond.com, 800-669-4583), to minimize the appearance of joint lines.

Not only is this cabinet (*WOOD*, Sept. 2008) made of walnut, but most of the gunstocks are as well. Walnut's weight and elasticity lessen recoil, and its ease of carving makes it a favorite for checkering grips and stocks.



Use a water-based walnut dye to blend walnut's light sapwood and dark heartwood. Start by moistening the heartwood with water to determine its finished color before feathering in dye with water.

Though walnut produces a distinct sweet smell, don't inhale too much. Walnut dust can irritate lungs and nasal passages, with some woodworkers reporting a severe allergic reaction. So use adequate dust collection and supplement it with a respirator or dust mask.

Flawless to the finish

You'll find that walnut accepts finishes with ease. Normally chosen for its natural dark color, walnut is rarely stained. It might, however, require some selective coloring to even out tone variations, or match sapwood to heartwood, as shown *above right*.

Filling the pores before finishing creates a super-smooth surface; and because you can do it without messy commercial pore-fillers, it's easier to accomplish than with other woods: After sanding, simply flood the surface with Danish oil, wet-sand thoroughly in a circular motion with 400-grit wet-dry abrasive, and remove the excess slurry by wiping it perpendicular to the grain.

Simpler still, a film-forming, oil-based varnish imparts a warm glow and multi-layered, multi-hued sheen to the wood.

Written by: **Lucas Peters**

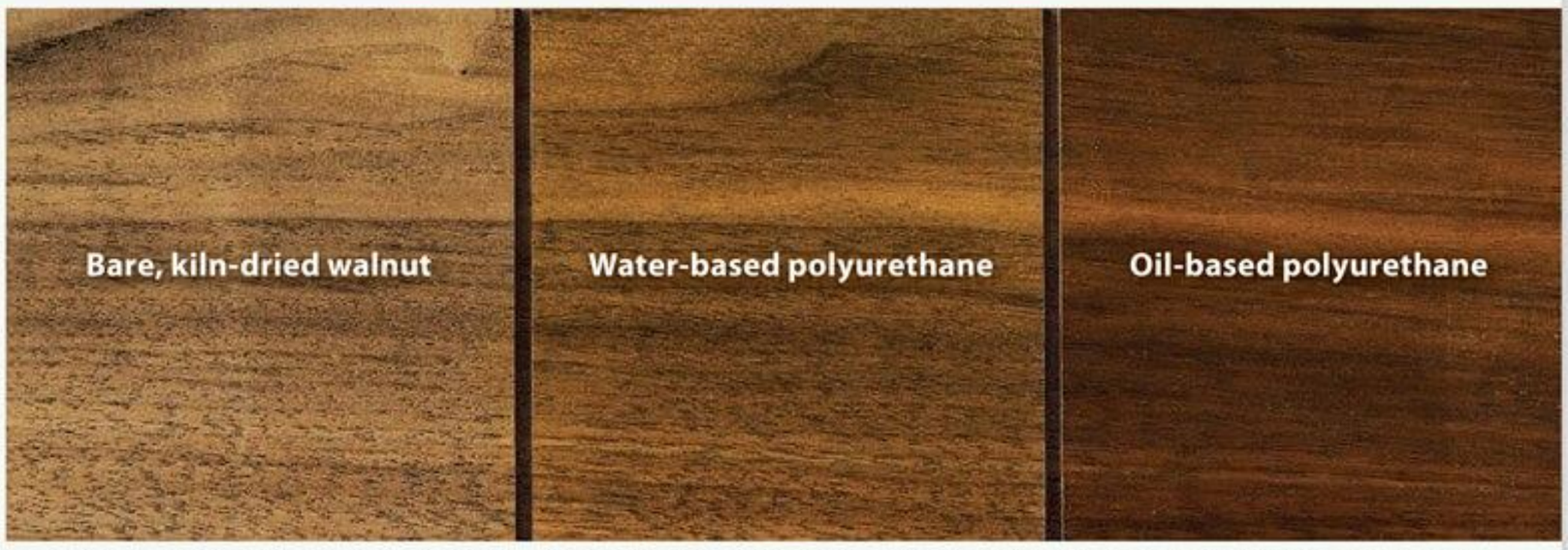
MORE RESOURCES

- For even more info about black walnut, visit woodmagazine.com/walnutguide.
- To buy an article on enhancing walnut's beauty, go to woodmagazine.com/walnutfinish.

REFRESHING KILN-LEECHED COLOR

Many kiln-driers pretreat walnut with steam to darken the creamy, white sapwood, minimizing its contrast with the heartwood. That increases the yield of acceptably consistent wood color, but also leeches color from the heartwood, dulling it to a grayer shade.

Air-dried walnut, on the other hand, retains its creamy sapwood, but also its deep, chocolate heartwood and the variety of purple and reddish tones mixed in its grain.



Water-based topcoats, *middle*, enhance the grain of kiln-dried walnut, but do nothing to revive its grayish tone. But an oil-based finish, *right*, brings the warm colors back to life.

Actual size is 40.6 mm

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Compact drills and drivers pack surprising punch

Although one of the last tool companies to tap into the 12-volt, lithium-ion cordless tool market, DeWalt nonetheless turned out a fantastic set of drills and drivers featuring this battery technology. I tested three models that best fit woodworking—a power screwdriver, standard drill, and impact driver—running them through the same tests used when evaluating this class of drill/drivers in issue 198 (July 2010). The drill led the way by driving an eye-popping 306 screws per charge—almost 50 more than the drill that topped the prior test. The screwdriver finished close behind, averaging 297 screws, and the impact driver tallied 223. All three tools also fully seated a ⅜×2" lag screw in pine with no difficulty, and the impact driver seated a ½×2" lag screw. None of the other tested drills could do that. Impressive.

Three LED lights circling the ¼" quick-connect chuck on both the screwdriver and impact driver illuminate the work area without shadows. But the drill's single light, located just above the trigger, doesn't light the work area as well.

Each comes with a 35-minute charger and two slide-mount battery packs. This mounting position also allows for a thinner handle and grip, which I prefer to the thicker ones featuring insert batteries. If I could buy only one of these tools, I'd go with the screwdriver. It costs $20 less than the other two and will accommodate all my driver bits; I can use my higher-voltage drill to bore holes.

—Tested by Jan Svec, a former WOOD® magazine project designer, builder, and editor

12-Volt Max cordless drill/drivers

Performance		★★★★★
Price	#DCF610S2 Screwdriver	$140
	#DCD710S2 Drill/Driver	$160
	#DCF815S2 Impact Driver	$160

DeWalt
800-433-9258; dewalt.com

Screwdriver

Drill

Impact Driver

Is it cordless? Is it pneumatic? Yes—it's both

Senco's Fusion 15-gauge, angled finish nailer eliminates the two biggest hassles common to other nailers: cumbersome air hoses and stinky fuel cells. This model uses an 18-volt, lithium-ion battery-powered motor that retracts the driver piston and compresses the air behind it. Pulling the trigger releases the piston, driving the fastener. And it does all this in a package that weighs a little more than 6 pounds.

I used the Fusion F15 to install wainscoting on my stairwell, and quickly appreciated how nimble it is. The nose pinpoints nail placement with clear visibility thanks to an LED light. It won't bump-fire as quickly as my pneumatic nailers, but I found it plenty quick enough.

And for clearing nail jams, the entire magazine comes off with the release of a lever. (The nailer never jammed on me, but it's good to know there's an easy fix if it should.) The F15 comes with one battery, and it drives 330 nails per charge. But you must remove the battery pack from the tool or turn the firing-mode selector switch to its "off" position to avoid depleting the battery when sitting idle overnight.

The 15-gauge nails have lots of holding power but leave larger holes than I'd like. Senco's Mischel Schonberg said two 16-gauge finish nailers and an 18-gauge brad nailer will be launched later this year.

—Tested by Kevin Boyle, Senior Design Editor

Cordless 15-gauge finish nailer, #FUSION F-15

Performance	★★★★★
Price	$400

Senco
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Recruit support to cut oversize acrylic

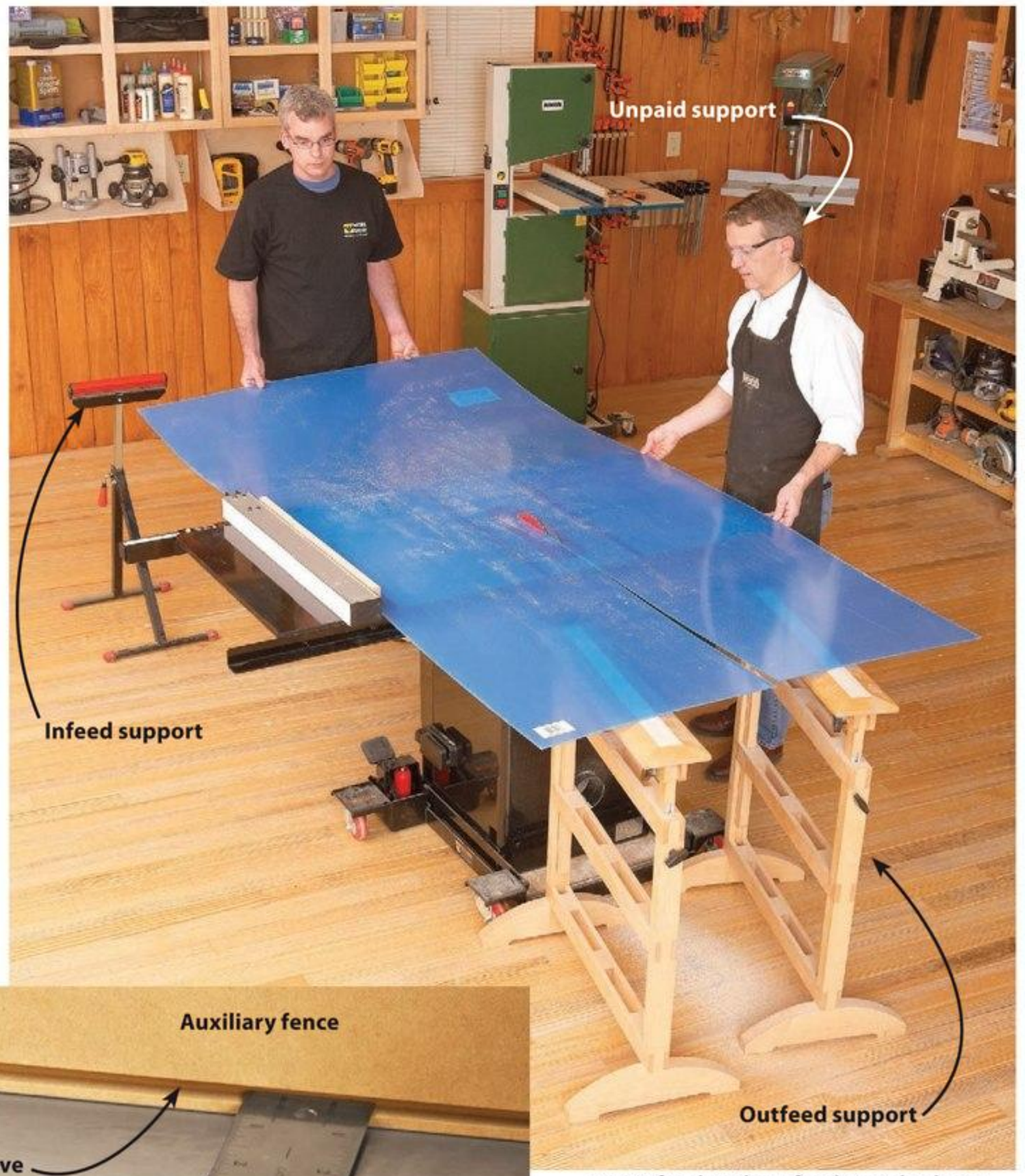
Q: For the gun cabinet I'm making, I want to use acrylic instead of glass in the door. I've cut acrylic before on my tablesaw, but I'm finding this large piece awkward to handle. How do I cut it safely and accurately?

—Adam Fedler, Fremont, Calif.

A: Support, support, and more support, Adam. First, create a grooved auxiliary fence for your tablesaw, like the one shown *below*. Make the groove slightly wider than the thickness of your acrylic, about ¼" deep and positioned ⅛" from the bottom edge. The groove traps the acrylic, lending it rigidity to resist bowing up as it rides over the tablesaw blade.

Second, use plenty of outfeed and infeed support. Lower the outfeed support slightly below table level to account for any droop as the acrylic comes off. Ensure that the infeed support doesn't interfere with your path toward the saw as you cut.

Finally, cutting full pieces of acrylic like the one shown isn't a one-man job, so recruit a helper. Have your helper loosely guide the edge and keep an eye on the outfeed end while you focus on guiding it against the fence and through the blade. This method also works well for cutting thin sheets of plywood.



Use infeed and outfeed stands along with the aid of a helper to safely cut unwieldy acrylic.

A steel rule set inside the auxiliary fence's groove helps you position the fence for the desired rip width.

continued on page 82

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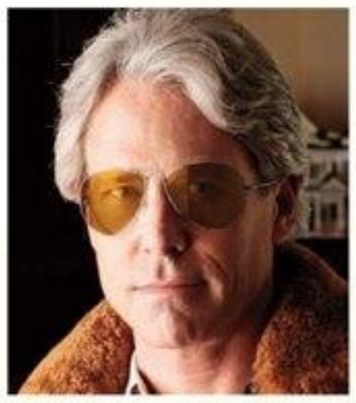

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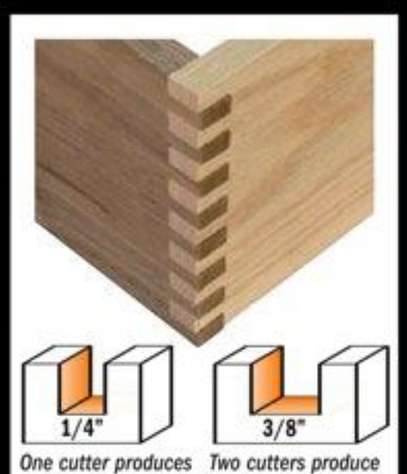

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Ask WOOD

A fix for color bleeding from padauk

Q: I recently built a maple box with padauk accents. Everything went well until I applied a finish. That's when color from the bright orange padauk bled all over the white maple. Ugh! How do I prevent the bleeding?

—Aldo Miller, Cleveland, Ohio

A: Yikes, Aldo, sorry about your troubles. Oily, vibrantly colored woods, such as padauk, purpleheart, and bloodwood, can cross-contaminate nearby woods in a couple of ways: colorful oils leeching into the glue and finish, and dust from sanding settling into pores of adjacent woods.

To prevent color-bleeding, immediately before glue-up, thoroughly wipe down every surface of the padauk with acetone to remove any oil on the surface.

After finish-sanding the completed project, thoroughly vacuum the surfaces to remove all dust that might muddy the finish on lighter-colored woods. Then repeat the acetone wipedown to remove any residual oil that wicked to the surface in the meantime. Finally, use tape to mask off the padauk elements of the piece before applying an initial seal coat of finish. Remove the tape, and finish the entire piece as usual. Protected by the seal coat, the surrounding, lighter-colored woods resist contamination.

Scraping, rather than sanding, reduces cross-species contamination caused by fine, powdery sawdust. Either way, vacuum your piece thoroughly, and wipe it with acetone prior to finishing.

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Cold-weather considerations

Q: I'm setting up my shop in Ontario, Canada. The shop is insulated and has a wood-burning stove, but I won't be able to consistently tend it. How will these temperature shifts affect my woodworking?

—Peter Roberts, Toronto

A: Congrats on the new shop, Peter. Here are some ways that cold impacts your woodworking.

Glue-ups and finishes require additional drying time. Most glue and finish manufacturers recommend that the glue, finish, air, and surfaces all be above about 50° F. (That's 10° C, in your neck of the woods, Peter.) So, if you're not able to maintain that temperature in the shop for the duration of the application and drying, consider bringing the project into the heated house (preferably into your well-ventilated basement) for those operations.

With cold weather comes dry weather. In the winter, your project wood will experience its most shrunken state. When the big thaw comes, that wood will start to expand with the increased moisture. Account for this in your projects by leaving extra expansion space in frame-and-panel assemblies, tabletops, and drawer reveals.

And because your wood-stove-heated shop will alternate between cold and warm, watch out for condensation on your tools. Protect your cast-iron surfaces with a rust protectant such as Boeshield T-9 (Rockler item no. 53470, 800-279-4441, rockler.com) or Empire TopSaver (Rockler item no. 20243).

Once you've warmed your cold winter shop, a baby-bottle warmer speeds the process of warming chilled glue.

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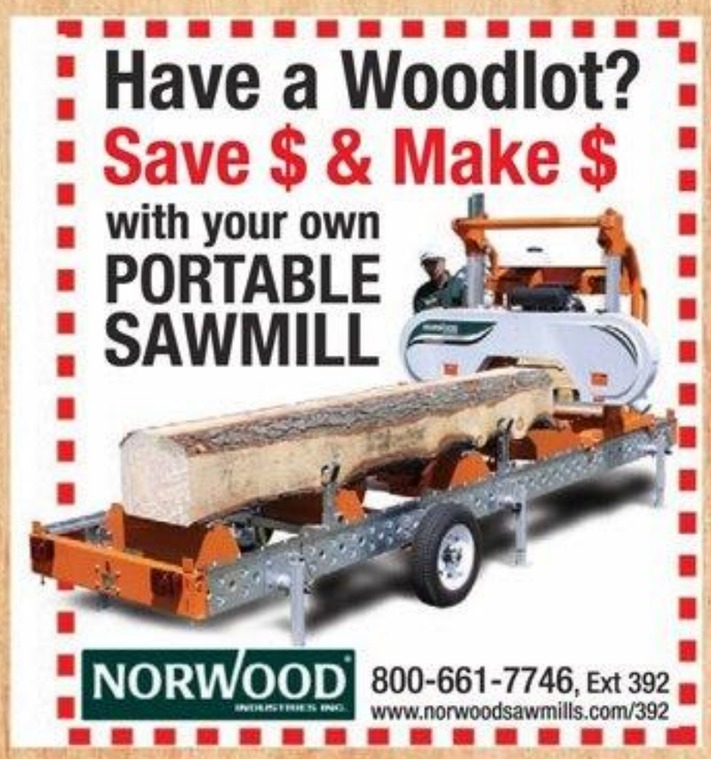

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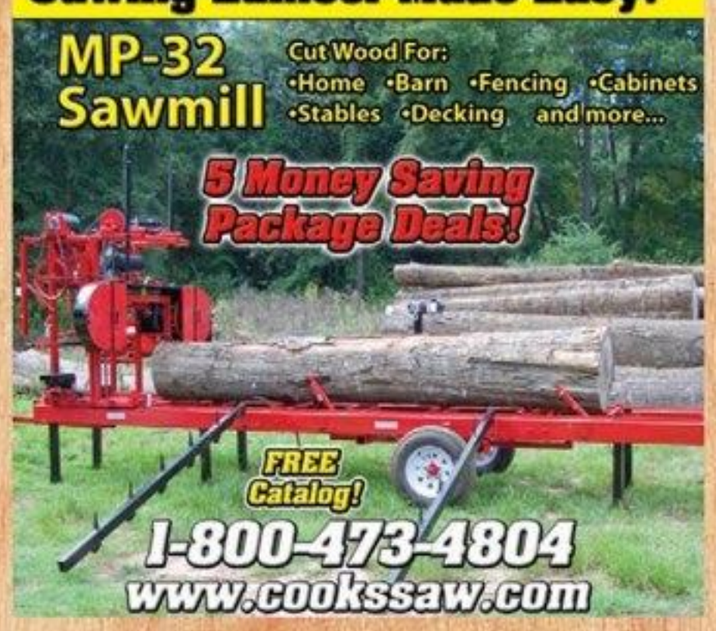

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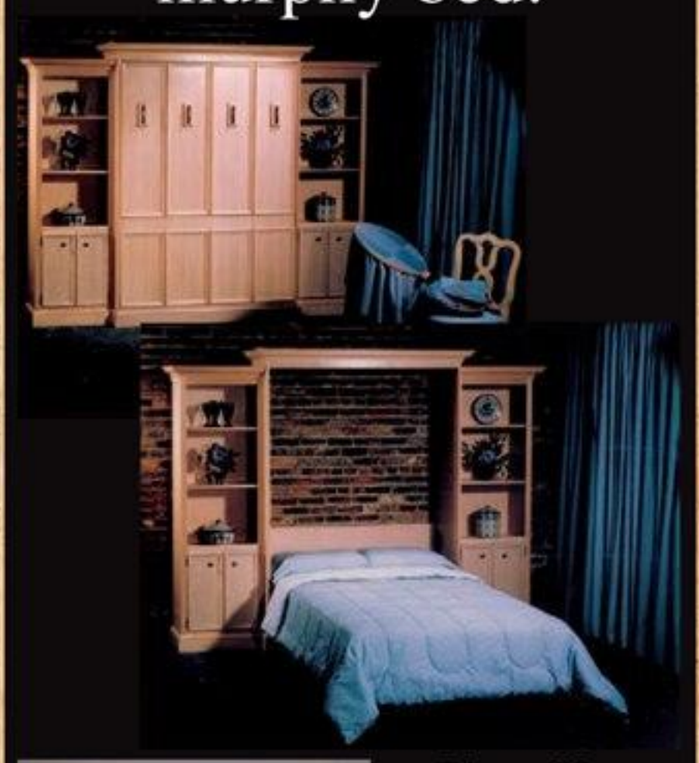

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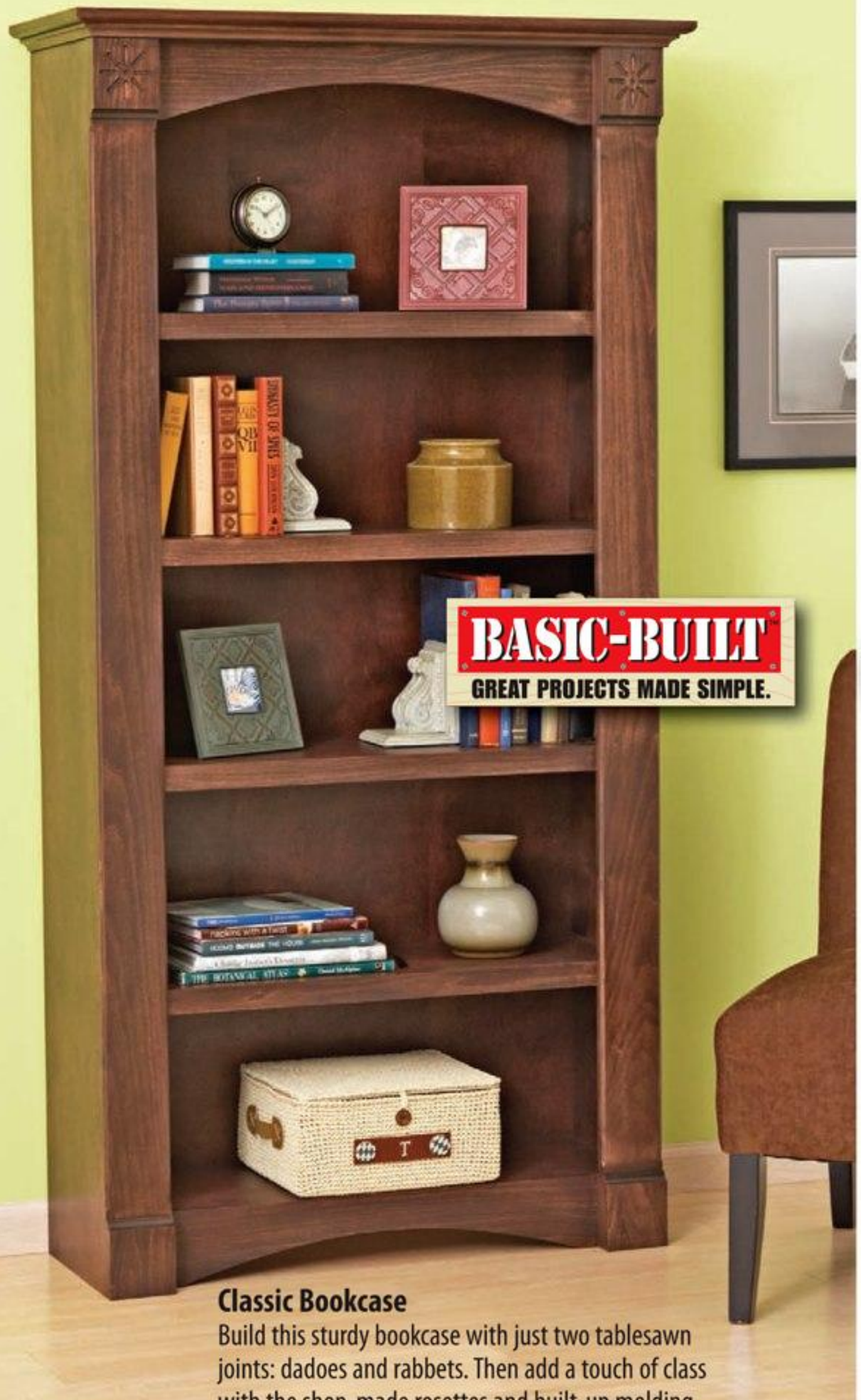

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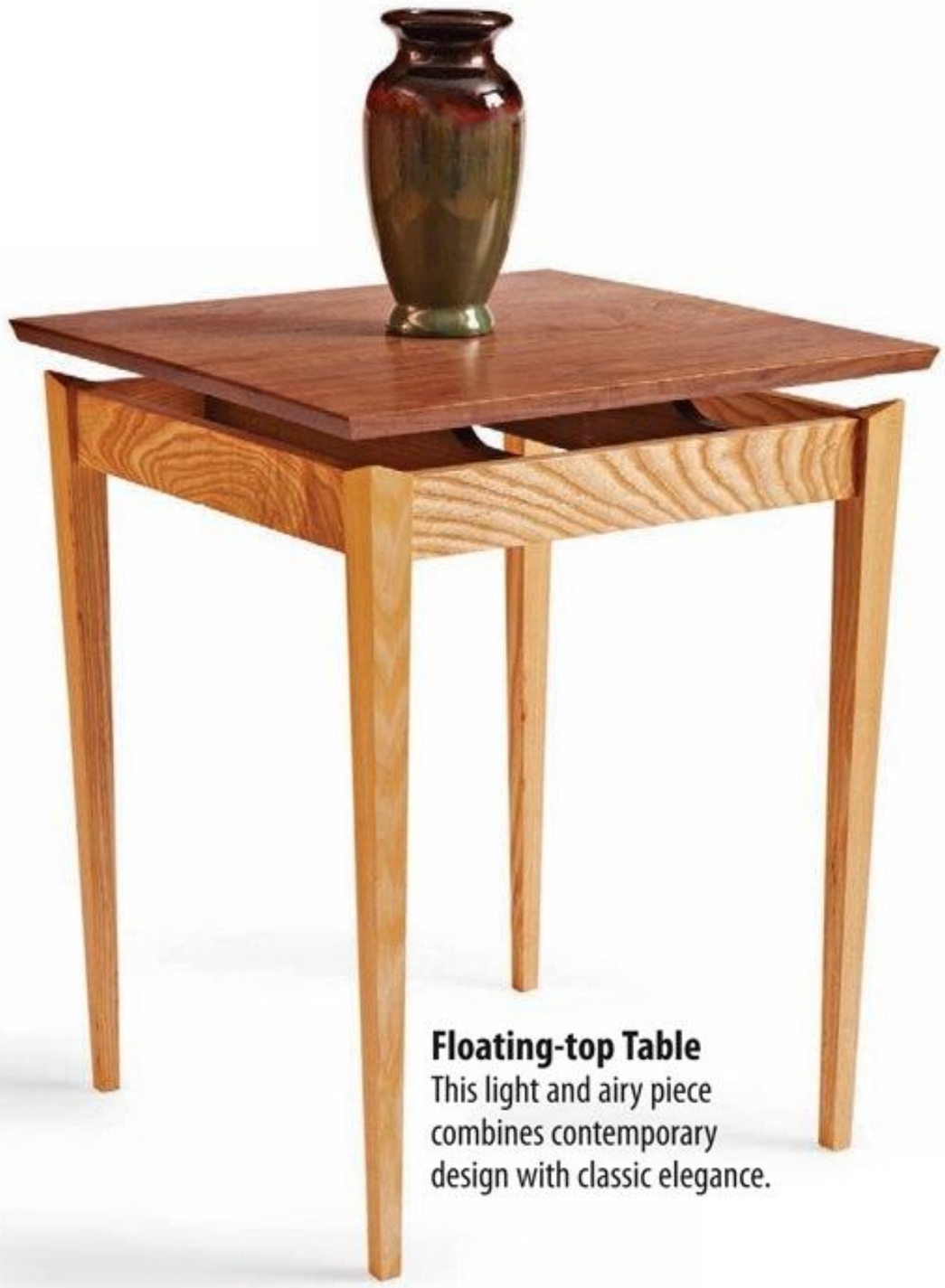

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